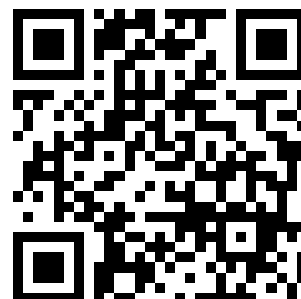

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American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

JANUARY, 1922

Vol. 13—No. 1.
10 Cents the Copy.
\$1.00 Per Year.



A Friend in Need ¹²²⁰/₉

Over a million motorists carry the simple Shaler Vulcanizer for emergency use in making quick, permanent tube repairs—at home or on the road. It is the greatest convenience ever invented for the motorist.

“Worth Its Weight in Gold”

Every motorist needs a Shaler—but especially those who do most of their driving on country roads. It saves repair bills—is easy to use and inexpensive. The Shaler works automatically—and without fail—in wind or storm.

It's so simple that anyone can make perfect repairs. Just touch a match to the solid chemical fuel. In five minutes the cut or puncture is repaired—a heat vulcanized, permanent repair that will not come off, better than any temporary “stuck on” patch—stronger than the tube itself.

Complete Outfit \$1⁵⁰ at all Accessory Dealers

The Shaler 5 minute vulcanizer also repairs rubbers, rubber boots, hot water bottles, rubber gloves, coats, etc.

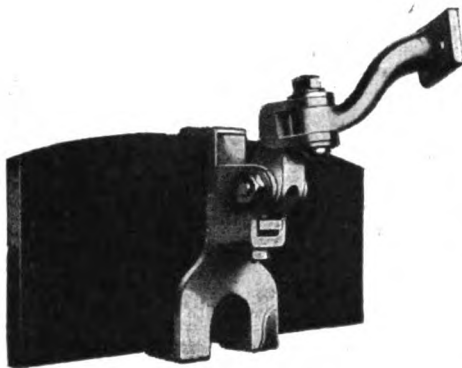
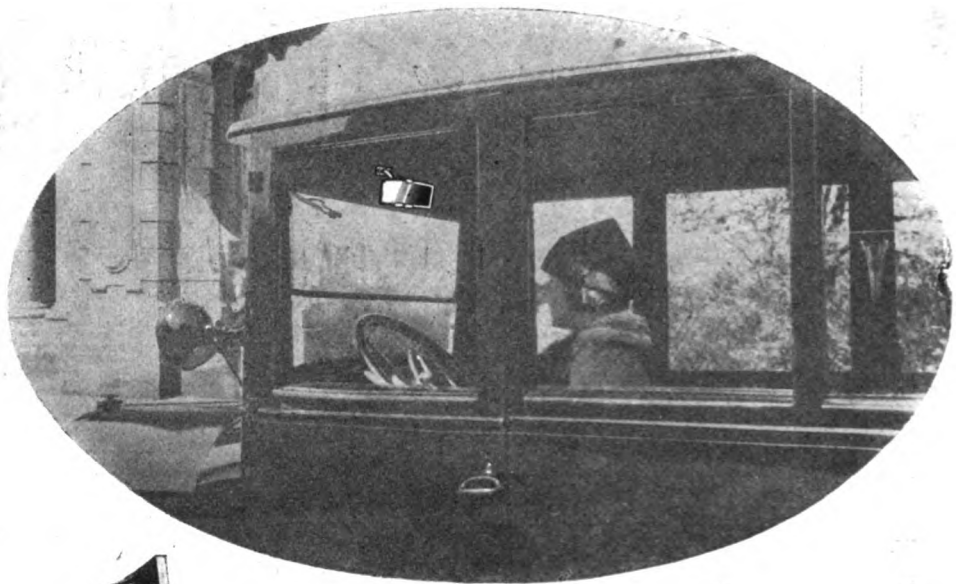
The outfit includes—

The Shaler Vulcanizer — 12 Patch & Heat Units, with complete instructions. Extra Patch & Heat Units 75 cents a dozen. Prices slightly higher in Canada and West of the Rockies.

C. A. SHALER CO.
350 Fourth St., Waupun, Wis.



The Quality Mirror



Model C. Style No. 1.
Oval 8 x 2 3/4 in.

This style is extraordinarily effective for Sedans, Light Sixes, Coupes and Limousines, and one of the few interior mirrors that will fit Ford Sedans and Coupes. The extension arm is designed to give a perfect drop, allowing generous clearance to the upper half of the windshield when it opens inward.

List Price, \$4.00

THE Chief Auto Mirror is without question "The Tiffany of all rear view mirrors". In construction, appearance and convenience it combines every element of real merchandise and will prove the best repeat order mirror you have ever handled.

In construction, it is mechanically perfect. The mirror is held secure against rattling by good looking clamps eliminating the cheap metal frame and preventing complaints of rusting and corroding. The brackets are interchangeable on every Chief Mirror and allow the adjustment of the mirror to any angle and keeps it there. The Chief Mirror brackets make it easy to fit any model—open or closed car.

In appearance, *this mirror is without competition.*

Only the best quality French crystal, with a slightly beveled, non-reflecting edge, is used. The mirror is so secured that you enjoy a complete reflecting surface unobstructed by either a frame or heavy clamps.

In convenience it will give the customer constant satisfaction. *It stays adjusted.* It won't rattle or jolt out of position and it is as easy to attach as it is to adjust at the desired angle. The silvering is protected by a patented process. If the mirror spots, peels, chips, blisters or deteriorates within a year, we will replace it without charge or quibbling.

JOBBERs AND DEALERs ARE NOW STOCKING CHIEF AUTO MIRRORs AS THEIR PREFERRED LINE. IT IS A QUALITY ARTICLE AND SELLS ON MERIT ALONE.

If you have not received a copy of our illustrated Price List let us send it to you and show you the way to a real, highly satisfactory mirror business.

Britton Auto Products Co., Inc., 119 West 63rd Street, New York City

Simplified Bookkeeping for Automobile Men

NO BUSINESS demands more care for details in figuring costs than that of the automobile repair shop and garage. And probably no other business has so little time to devote to accounting. Consequently, in the rush of work in the mechanical department, with customers clamoring for their cars, many details that should have been included in customers' bills are forgotten and sometimes items are figured into costs to customers that do not belong there. Often bills are made to which the proprietor has forgotten to add his margin of profit. The peculiar character of the work is responsible for most of the confusion.

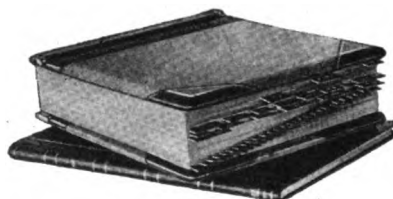
Old-fashioned bookkeeping and checking systems are not suited to the automotive industry. The red tape involved is not adapted to the repair shop, garage and automobile sales-room accounting. Too much time is lost in meaningless repetition. Because of this stress for time there is a temptation to guess at costs and guessing is a wide-open door to losses. BUT—Comfort has changed this order of things.

You can now have order, ease and absolute accuracy in place of confusion. You can stop worrying over details. You need no longer spend weary after-hours poring over a tangle of memoranda and books. You need not indulge in nerve-racking memory efforts or take chances on guessing at costs and you can go home carefree every night in ample time to eat supper with your family.

You would give a big sum to end business worries, the misery of details and have a greater number of hours to devote to recreation, wouldn't you? But you do not need to because you can get

\$25. COMFORT'S OFFICE RECORD—A SIMPLIFIED ONE-VOLUME BOOKKEEPING SYSTEM FOR \$25.

With the use of this book accounting worries vanish. It is made solely to fit your business. It is so simple you need have no previous knowledge of bookkeeping to freely operate it. It requires a minimum of time. It will take care of all the details of your business. It will assure you profits on every job. It will always give you and your customers a square deal. It ends the annual income tax bugaboo by giving all information required by the Government at a glance.



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"ALL GOODS F. O. B. YOUR CITY"

COMFORT

Printing Specialty Company

101 N. Eighth Street, Saint Louis, Missouri

192
COMFORT PRINTING SPECIALTY CO.,
101 No. Eighth St., St. Louis.

Please send us (on ten-day approval) Comfort's Complete Office Record, for which we enclose—check—cash—P. O. order for \$25.00.

It is understood that we may return same within ten days from its receipt if not satisfactory.

Name

Address

City

CHAMPION AIR SERVICE

will make 1922 a good year for many

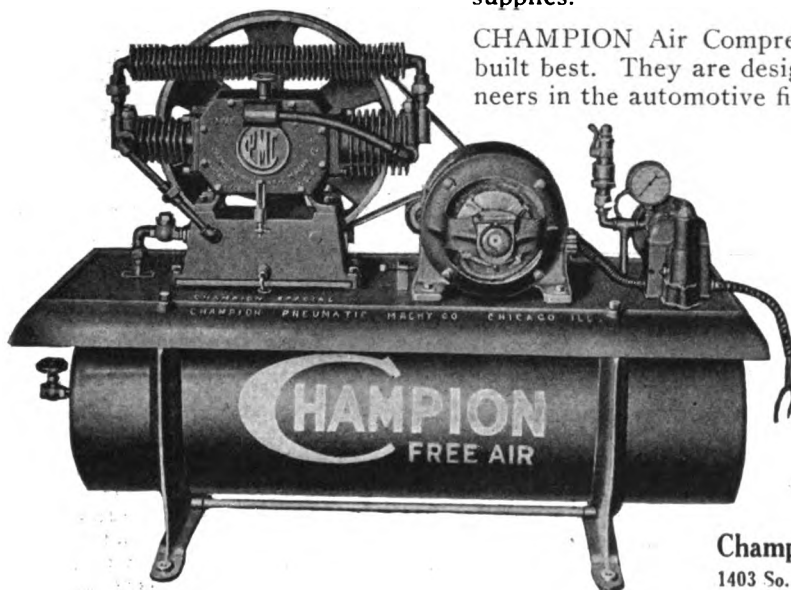
garages, service stations and repair shops. The rapid, reliable service rendered by Champion equipment always makes a pleasing impression. The motorist comes again to the same place to have his tires filled and returns for his repairs and supplies.

CHAMPION Air Compressors serve best because they are built best. They are designed by some of the foremost engineers in the automotive field and embody a number of special features including: valves of mushroom type housed in bronze cages, annular ball bearings, and an automatic pressure release which permits motor to start against no pressure.

CHAMPION Air Compressors require a minimum of attention and are exceedingly economical to maintain. Made in many types for all requirements.

*Let us send you literature.
Address Dept. A.*

Champion Pneumatic Machinery Co.
1403 So. Michigan Ave. Chicago, Illinois



Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

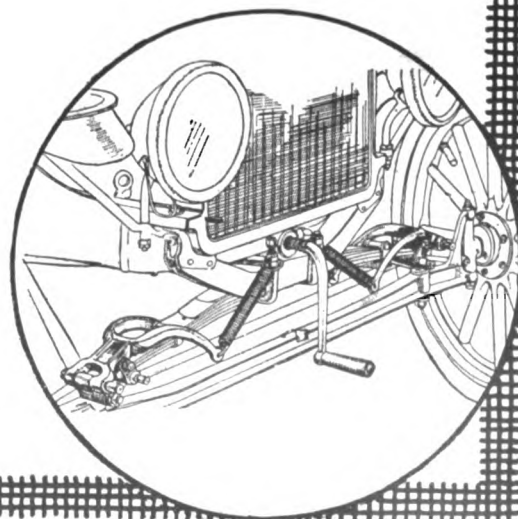
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

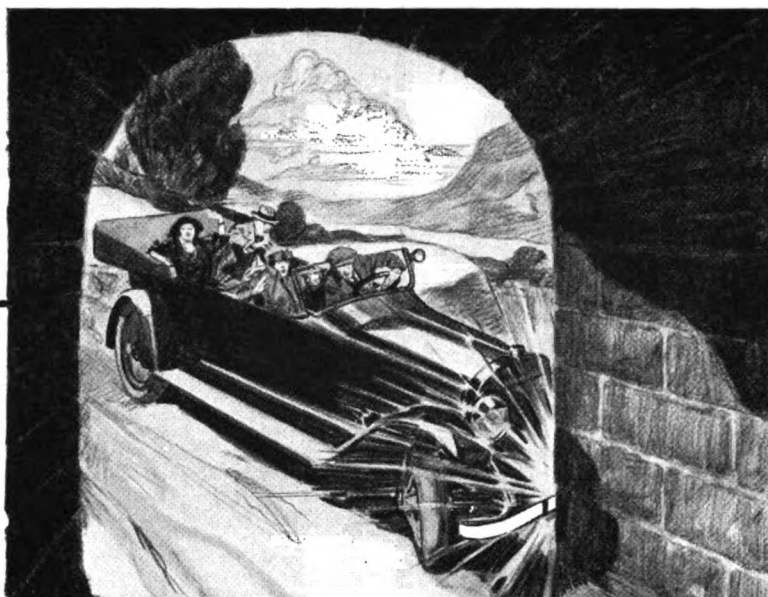
Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD WILCOX CANADIAN CO., Ltd.
London, Ont., Canada





A Sharp Turn--CRASH!!

See our exhibit at
the New York and
Chicago Automobile Shows.

New York

January 7th to 14th

Spaces
D 191-192

Chicago

January 28th to
February 4th

Spaces 100-101

—but the car wasn't damaged; Lyon Bumpers yielded to the blow—and absorbed it!

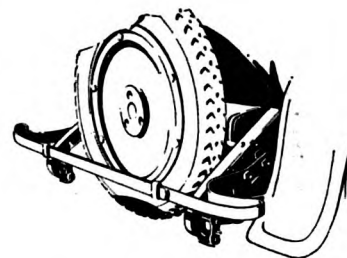
No other bumper can take such punishment—that's why Lyon Bumpers are so easy to sell; from any angle they will take the full force of a blow at 15 miles an hour without damage to themselves or the car—that's guaranteed!

It's the Lyon patented opened "loop-ends" that give our bumper its extraordinary resiliency—this feature, plus the finest spring steel, makes Lyon Bumpers a positive protection against collision damage.

These bumpers—the original all-steel spring bumpers, are mighty good looking, too. Their appearance alone attracts many a customer who can easily be sold when you tell him that insurance companies actually pay for them by reducing their rates $12\frac{1}{2}$ per cent on cars protected front and rear with Lyon Bumpers.

This means two profits for you—and the profits are substantial. Your jobber should be able to supply you with a stock of Lyon Bumpers; if he can't, write to us and we will take care of you.

Metal Stamping Company, Long Island City, New York



Lyon Bumpers are quickly and easily attached to any car, even when equipped with Snubbers. No alteration is necessary.

List prices of the regular Lyon Bumper range from \$10.00 to \$17.50, according to size and finish. The Lyon Convex Bumper, having all the bumping advantages of the regular Lyon Bumper plus an unusual design, lists for a slightly higher price.

The Special Lyon Bumper for Fords lists for \$10.00 to \$13.00. Will fit Fords equipped with Hassler Shock Absorbers.

Car Dealers: Lyon Bumpers are manufactured and sold under basic Lyon patents. They are the original all-spring resilient bumper. More than a million are in use today!

Jobbers: If you do not already handle Lyon Bumpers, write to us; we have a fair and square proposition that will benefit both of us.



Lyon Standard Bumper



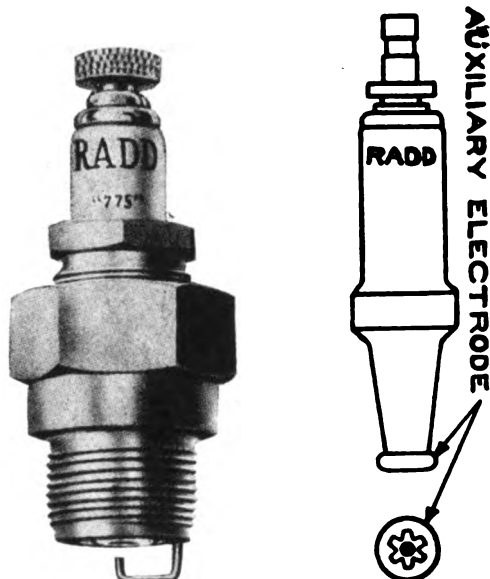
Lyon Convex Bumper

LYON

RESILIENT BUMPERS

THE RADD SPARK PLUG

Fires Where Others Fail



The Only Plug with Auxiliary Electrodes that Assist the Discharge of the Main Gap.

The RADD produces a small spark in advance, aiding the discharge of the main gap. The result is a larger, hotter spark, a smooth running engine which misses less frequently and reduces vibration. Better ignition keeps the RADD spark plug comparatively free from carbon and oil deposits.

This feature makes RADDs WORTH MORE because RADDs SAVE more.

Other plugs require 60 per cent more voltage to fire. There is no exception. RADDs improve ignition under all conditions.

RADDs burn up excess oil—Reduce carbonization—Fire on ignition systems too weak to produce a spark with ordinary plugs. Fire under 20 pounds greater compression than any other plug—THE AUXILIARY ELECTRODE DOES IT.

Make a test in an oil pumper and convince yourself.

MADE IN ALL SIZES.

DEALERS—Sell the plug that improves the ignition of any car, truck or tractor. Send in the coupon for complete data.

LEICH ELECTRIC COMPANY
Genoa, Illinois

Leich Electric Co.,
Genoa, Ill.

Please send us complete information and trade prices on RADD Spark Plugs.

Name

Address

American Garage & Auto Dealer

A Business Paper for the "Small-town" Automotive Trade

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B. I. CAMPBELL

WATERVLIET

SPIRAL EXPANSION ALIGNING REAMERS

FOR FORD
PISTON PIN
BUSHINGS

The Tool the Mechanic Keeps Under Lock and Key

FOR accurate aligning of piston pin bushings on the Ford, the experienced repair man chooses this reamer from his entire kit of tools. And, he is so thoroughly convinced of its mechanical ability that he keeps it safe from "sticky" fingers!

The Watervliet Spiral Expansion Reamer takes up the job where the best reamer you have quits cold! The Self Cutting Pilot does the boring at the beginning while the Reamer proper finishes the job. The spiral flutes cut easily, and accurately, leaving a full bearing surface with a mirror-like finish.

Another point, this tool can be accurately adjusted, stays sharp and makes it an utter impossibility for even an amateur to ream holes out of alignment.

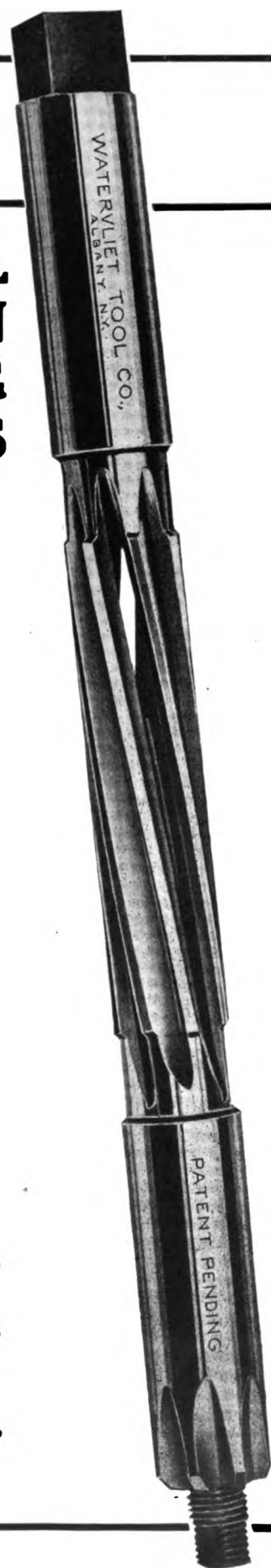
This reamer saves an extra operation, completes the job in less time, more accurately and with less effort. It appeals to the veteran service man because it is a real tool built for a particular purpose.

In addition to our Spiral Expansion Aligning Reamers for Fords, we also manufacture a complete line of solid reamers for every bearing and bushing on the Ford car, as well as a full line of Spiral Expansion Reamers for piston pin bushings on every car and truck made. Our descriptive catalog of Watervliet tools will be mailed on request.

**Buy Your Watervliet Spiral Reamers
from Your Jobber — He Has Them.**

They Will Not Chatter

WATERVLIET TOOL CO., Inc.
ALBANY, N. Y.



A Warm Motor on a Cold Morning

**A
COLD
GARAGE** **?** **PUSH BUTTON--
INSTANT
START**

ANNOUNCING

Advance Information to Dealers pertaining to an Electric Auto Heater.

The Heater can be quickly installed on any make of car. Its operation is simple. By merely connecting a drop cord from a convenient socket to the plug on the heater, the coil around the heat element becomes hot within three minutes—heating the cold water in the coil which is forced into the top of the motor block, by the constant pressure of cold water from the Radiator thereby creating continuous circulation. It maintains a temperature of 140° Fahrenheit in the unheated garage in the coldest weather.

The Heater is mechanically perfect, guaranteed against defects in material and workmanship. Satisfactory service guaranteed for two years or a new Heater free.

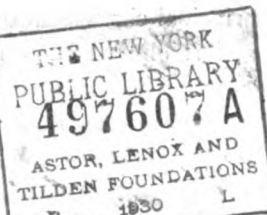
To dealers interested we will gladly convey details of our Advertising Campaign which will be instituted within ten days. We conduct a direct medium under the name and for each of our dealers which acquaints every prospective buyer in their territory with the merits and details of the Heater.

**For Information
Address Box 45**

**AMERICAN GARAGE and AUTO DEALER
116 So. Michigan Ave., Chicago, Ill.**

American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.



Vol. XIII. No. 1.

CHICAGO

JANUARY, 1922

Building for the Future.

"The automobile industry suffered no greater curtailment last year than any other industry," declared a prominent motor car manufacturer, recently. "Companies able to produce economically and offer good value will have nothing to complain of this year."

The total motor production of 1921 is estimated at 1,680,000 cars, of which 1,525,000 were passenger vehicles and 145,000 commercial cars and trucks. As the 1920 production was approximately 2,210,000, the 1921 production was only 24 per cent under that of 1920.

These production figures are much better than many leaders in the automotive industry had expected. Indeed, in June, there was a prevailing impression that the 1921 output of cars would hardly be more than two-thirds that of 1920.

It is expected that the sale of parts, tires, fuel, lubricating oil and other accessories, will reach new records this year. There have been decreases in the prices of gasoline and oil and these with the lower prices of cars make for a low upkeep cost. These lower operating costs, it is expected, will increase the use of cars and trucks, and bring additional customers into the market.

This year it is predicted will see new methods and new policies adopted and companies and individuals tested, for competition will be keen as the buying public is now most critical.

In general business, the consensus of opinion is that a sound foundation for business in 1922 was laid last year. It is generally agreed, as we en-

ter the new year, that domestic business in general has passed through the most critical phase of the depression and, under the stimulus of easier credit conditions, is gradually resuming normal activity.

The financial structure of the country rests on a firm base, and a reviving

FACING THE NEW YEAR.

"The economic situation for the new year holds much good promise. Our year of liquidation is over and we can look forward to a year of recuperation. Except for the seasonal dip of the winter we should have a continuous lessening of unemployment and an increasing betterment in the agricultural situation.

"We have passed through the most precipitous price drop in our history—a drop averaging nearly 50 per cent and necessitating the writing of something over \$20,000,000,000 off our books as a nation during 1921. We have gotten through the credit strain that has been involved in this violent writing down of national inventories; we have absorbed the enormous surplus of goods carried over from the post-war boom; we are on much sounder foundations.—Secretary of Commerce Herbert Hoover.

business confidence, together with the depletion of accumulated stocks, has prepared the way for a larger volume of production and a consequent fuller utilization of industrial equipment.

The international situation appears to be gradually clearing. The economic conference, which will be soon held at Cannes, undoubtedly will do much toward facilitating the trade between this country and the other countries. With the foreign trade problems solved so that a demand can be created abroad for agricultural and

manufactured products of this country, conditions in this country should be most favorably influenced, particularly the farm situation.

The New York Show.

In January, automotive men from all parts of the country turn toward New York and Chicago, for the national automobile shows held in those two cities are regarded as the opening of the automotive year.

The New York Show is in progress as this is being written, but reports state that new attendance records are being made daily. Another feature of this show was the number of different makes of cars exhibited—92, four more than the records set last year. Another record appears in the fact that this year 12 new makes of cars made their appearance for the first time in a national show.

Preceding and during the course of the show a number of manufacturers announced price reductions—and this was probably the most discussed topic at the show. Many of these reductions were quite radical and furnish a clear indication that keen competition will undoubtedly characterize this year's motor car business. Some makes of cars are now being sold at less than ever before, and the majority are at lower levels than at any time prior to the war.

The improvements noted in the passenger cars are mostly of a conservative character. Manufacturers have sought for greater efficiency and economy of operation, so that purchasers are obtaining greater values than they have for many years.

The principal changes in the passenger cars were observed to be in wind-shield and hood designs, the basic principles of body lines remaining unchanged. More cars than formerly are hung low, which type of construction eliminates side-sway and much unnecessary vibration.

There was a greater number of enclosed cars on exhibition than before and their low prices were particularly interesting.

One of the leading car manufacturers in commenting upon the New York Show declared that it will mark an important epoch in the motor car industry.

"It is not only one of the most interesting, because of the new models exhibited for the first time," said he, "but it also marks the most definite turning point in general automobile sales and business conditions in the industry. I look to see the interest aroused by this show starting an improvement in general automobile conditions."

And that was the general expression of opinion.

Thoughts of Sales Executives.

All over the country, business men are seeking ways and means of increasing profits. The past year has caused a tremendous lot of thinking and analyzing of the situations at the present time.

The retailer knows his costs are too high, but he does not know how to solve the problem.

An interesting fact is that the failures in 1919 and 1920 were less than in the last 40 years. This was because it was easy to make money so, naturally, regardless of business methods, the retailer could not fail. During this period, many dealers strongly entrenched themselves and developed an excellent business.

Wholesalers and retailers find their costs are above normal. The overhead is difficult to bring down. Taxes, heat, light, rent—all remain high. Wages and services, also, cannot be

reduced because of possible danger to the business as the information is spread among the public.

The number of employes, likewise, cannot be reduced, for the answer that is being made to the question of how to improve the situation is "get an increasing volume of business." A stronger sales effort must be made, and the energy behind it increased. Sales of merchandise must be increased 20 to 50 per cent.

Looking over the stock, it is found that some goods move faster than others. So, while it may appear rather strange, the manufacturer would do well to advise the dealers who sell his products to "narrow down your lines," in order to get more volume of sales and to get more space for stock and a greater turnover.

There is another factor that enters. The clerks must devote every moment to selling merchandise. They cannot

Thrift Inspires Resourcefulness.

An individual cannot practice thrift without at the same time broadening his knowledge, cultivating his judgment and intensifying his sense of responsibility. A thrifty worker is a steady and more careful worker—a sober worker. He will not waste either time or material; he will be careful in the use of tools and machinery. A thrifty worker usually is a cheerful worker; his thrift has obviated anxiety about the rent and other outlays. A thrifty worker is also a resourceful worker because the practice of thrift cultivates ability to analyze, to plan and to execute—which is what we understand by resourcefulness.—F. C. Schwedtmann.

spend much time in talking about merchandise in order to make a sale, for the volume of sales must be increased—and there are only a limited number of hours in each day. Time must be conserved. The salesman, therefore, must be ready with suggestions as to what to buy.

Naturally, they cannot suggest things that require an extended argument to convince the prospective purchasers. They must suggest articles that are familiar to customers through advertising. Advertising plants and cultivates the ideas and the salesman

reaps the harvest. With the non-advertised article the dealer has to plant the idea and cultivate it before he can close the sale—and that all takes time.

Signs of the Times.

In a recent discussion before a group of business men, the matter of selling was brought up. One of the men, speaking of recent changes, pointed to the marvelous development of education in the past few years. He stated that colleges and schools do not know what to do with the applicants for admission, as their facilities are entirely inadequate to cope with the situation.

He pointed out that, in 1890, there were 400,000 pupils in the high schools and, in 1920, 2¼ millions were enrolled. In 1920, there were more students in colleges than there were in the high schools in 1890.

This, he pointed out, will have a tremendous effect upon the value of advertising. The number of people who can read and think is increasing rapidly, and these people will be influenced by the advertising which is presented to them in the many different channels.

As an instance of the stupendous increase in advertising, it may be pointed out that, in 1892, one of the very large magazine publications had ¼-million dollars of advertising and, in 1920, it had 38 million dollars of this business. There was a most rapid increase from 1908.

It is interesting to note the ten classes which showed the largest amount in 1920 for this particular publisher. The classes, in their order of size, were: Foods, toilet preparations, electrical apparatus and supplies, household materials, automobile utilities, passenger cars, structural materials, tires and office supplies.

In connection with this it might be noted that the style of advertisements of automobiles is undergoing a change. Instead of an appeal based upon sentiments and feelings, the appeal is now to reason, economy of operation and price values being featured.

Sell Them Motor Power Machinery

This Handsome New Garage and Repairshop a Culmination of the Foresight of Two Men Who Saw the Possibilities in Sales of Motor Power Machinery—Valuation of Personal Element and Good Advertising Helped

By J. Chenault

Striving for more substantial, convenient and modern buildings in which to display their goods more effectively, was the aim of Parks-Richardson Auto Co., of Lawrenceburg, Tenn., in the construction of its new garage and automobile repairshop.

The structure, of necessity, had to be larger than any the little city afforded, in order to accommodate the vast trade resulting from the thousands of cars that pass through, and also because of the resident motorists who make their abode in Lawrenceburg since the completion of the modern highway on the old Jackson military road-bed.

It is the first structure of the kind in that section and, during the building process, the gigantic steel skeleton bars presented remarkable strength in their bridge-like appearance. Some remarked that the roof would be capable of holding up the heaviest of snow-storms.

As this company handles tractors, farm implements, and has the exclusive trade for the Ford motor car, as well as doing repairwork, a building of greater area and stronger construction was required. Since its completion, there is room for the convenient display of machinery.

This was quite impossible in the small space occupied in the former "Ford Home" of this company which, in reality, consisted of the lower floor of a two-story brick structure of extreme smallness, the local telephone exchange occupying the upper story. Hence, it was undesirable and altogether unsafe.

The new garage is conveniently situated, being on the street running

onto the northern side of the public square, and the principal business center of the city. It is, therefore, handy for tourists coming in from the north, most of the travel coming from that direction. It is also a good location for hauling freight from the railway depot without crossing the square, and is a time-saver and expense reducer.



Parks-Richardson Garage, Located in Principal Business Center of Lawrenceburg, Tenn.

M. Richardson, of the Parks-Richardson Auto Co., has been dealing in the hardware business in Lawrenceburg for several years, handling farm machinery and tools, stoves and accessories for the modern farmwife, furniture, and sport goods. But, like so many other dealers, he foresaw the great opportunity held out to those who deal in motor-power machinery, so he has taken up the sale of Fordson tractors and Ford cars.

The old stand being far too small for his requirements, upon the erection of this thoroughly up-to-date and convenient garage and repairshop, Richardson has gone into partnership with Edward Parks. This combined company handles Ford cars, tractors, ploughs, harrows, etc., while Richardson still retains a remarkable hardware store of his own.

Under the management of the new company, a complete garage and re-

pairshop is carried on, with taxi cars whose drivers appear in uniform liveries. They also furnish service equipment to be sent in any direction.

The new building because of the additional space permits service and sales that heretofore have been impossible on account of the insufficient capacity of the buildings and the lack of conveniences required for proper operation.

The managers of this company are public-spirited men, who always help in local affairs of any kind, thus making many friends and helping to promote their trade. They obtain a booth at the county fair and demonstrate at this time as an advertisement. They also run an advertisement in the county paper, whose editor is

also of a co-operative spirit and does all in his power for his advertisers.

The direct-to-customer system is also used, where personal and friendly letters are sent to customers asking their needs and showing sympathy and interest in their affairs, acting the brother Samaritan many times in cases of crop failures and various kinds of hard luck.

Opportunities for unusual advertising schemes are the joy of the up-to-date business firm. An instance of striking interest presented itself unsolicited to Parks-Richardson Auto Co. recently.

All the shops and mills of this little city depend upon getting their power mainly from the city electric plant, which also furnishes water for the entire city. But, when each of the two big turbines gave way, and the wheels needed had not arrived, the power was insufficient to furnish a current

to business quarters for more than a few hours daily. This placed the big hosiery mills in a veritable dilemma.

The emergency was overcome and the mill kept running, however, as the manager obtained a Fordson tractor from the Parks-Richardson Auto Co., using this satisfactorily in the absence of the usual electric power obtained from the city plant. Immediately upon the arrival of the tractor, it was placed right up in the center of the mill, with the belt on the pulley and turning the entire shafting driving the machinery.

It was also pulling the electric motor.

The service rendered by the tractor was just as good as the electric service while the cost was much less. It was, therefore, a good advertisement for the advancement of trade for the hardware store.

This tractor stunt formed a basis for all advertising schemes of the company, the display of which emphasized the readiness of the company to help in times of emergency, as well as being a proof of the power and adaptability of their tractor.

Upon the completion of the new garage of the Parks-Richardson Auto Co., combined, one of the largest electric signs in this section was erected over their building. The lettering included the word "Ford," in the usual script, and other wording covering many different accessories which are handled in that line.

Over 175 electric lights are required to illuminate the big sign. This new attraction in the little city serves as an effective aid in drawing trade for the company.

Why Not Make It a Pay-Up Week?

Perhaps You, Too, Have Some of Those "Hesitatin'" Customers Who Can Pay but Like to Put the Bill-Paying Date Off Just a Little Longer—Some Persuasive Measures Which Have Brought in Many Delinquent Dollars

By Walter Engard

Merchants everywhere are complaining that collections are slow and rather hard to make. Probably the majority of business men have found, after footing up their annual inventory sheets, that they have an unusually large amount of capital tied up in accounts receivable—larger than ordinarily.

One very successful merchant states that his accounts receivable total three times his stock inventory. True, money is rather tight and many customers who, under normal conditions, have always been considered prompt pay are now allowing their accounts to drag along. On the other hand, there are some who are not in a position financially to pay as promptly as formerly.

Taken by and large, the majority of customers are able to pay their accounts if it absolutely becomes necessary for them to do so, or if some sort of influence is brought to bear upon them. Under economic conditions such as we are passing through, people are prone to be somewhat slower in the settlement of their obligations—even though they may have the necessary money laying in the bank—keeping such available money as they may have as a reserve. This leaves the business man to hold the bag.

Just recently a very prominent citizen of his community remarked, when discussing conditions, that he owed a number of accounts and that, while he had the money with which to settle them should it become necessary, he

was going to hold it in reserve until he saw how things "broke" for him after the first of the year. Scores of persons are doing likewise and, no doubt, under proper pressure, the merchant could collect a goodly number of accounts which otherwise might be of longer standing.

With the annual inventory off of his hands and the new year just getting a start, now is an ideal time for the business man to stage a "Pay-Up Week." "Pay-Up Weeks" as conducted by various merchants' associations have proven wonderfully successful in cleaning up accounts for merchants but, for various reasons, any number of merchants state that they are not in a position to participate in such events and, therefore, derive no benefit.

Such dealers may find it to their special advantage and profit to stage an individual "Pay-Up Week." Properly handled, such an event should prove productive of splendid results and enable the business man to collect a large amount of his outstanding capital.

In arranging for this event, the merchant should first determine upon a definite date for its inauguration. Then, in preparation for the event and as a means of announcing it to his trade, a special letter may be prepared and made ready for mailing to every customer owing the store an account no matter of what size.

This letter should announce "Pay-Up Week" and should be a direct ap-

peal to the customer to settle his or her account during this week. Of course, there will appear upon the books any number of accounts with which the dealer would not, for various reasons, wish to appear too persistent in his demand for settlement. This letter, therefore, should be mild in tone and not too stringent.

However, as a special inducement for customers to settle their accounts during this event, the dealer might do well to arrange to have on hand a supply of some small, inexpensive gift and announce in his letter that he will present a special gift to the first 100 or so customers who settle their accounts in full during this week.

He might also provide a somewhat less expensive gift which he may announce as a present to customers who make a good-sized payment upon their accounts during this week.

It will prove far more effective if he limits the number of gifts to be presented—that is, if his announcement makes mention of a limit, even though he should later decide to present a gift to all customers settling their accounts. By having a limit announced, prompt action will be induced on the part of the customer to come in early during the week so that he or she may be among the favored ones. "Something for nothing" usually makes a strong appeal, and many customers will respond to such an appeal who would not otherwise. Thus it may be used with wonderful results.

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Accounting:

In Garage Accounting There Is Probably No More Important Department to Be Considered Than the Storage Department Which Is Discussed in This Article—When He Has His Shop and Storage Departments Properly Organized the Garageman Has Success 80 Per Cent Assured

By J. Newton Boddy, C. P. A. (N. A.)

Auditor, Accountant, Systematizer, Specialist in Automobile Accounting

The storage department of the average garage is one which should receive serious consideration, especially in the larger centers of population. The two most important departments in the average garage are the shop and storage departments. Either department, properly organized, will prove an excellent feeder to all other departments opened up. The garageman—with these two departments properly organized—has success 80 per cent assured.

The matter of garage planning has been written up in this magazine probably more than any other feature of garage business. This is proper, as it is the most important item in organizing a garage.

The garage must be planned according to the locality it serves. The three items demanding the most consideration are: Utility or arrangement, economy of space, and customers' convenience.

Local conditions will govern to a large extent, whether it is a one-floor, two-floor or three-floor structure. The AMERICAN GARAGE AND AUTO DEALER has accumulated numerous plans and suggestions which are yours for the asking.

Storage is usually designated as "transient," "regular" or "dead," and the space allotted to each class often varies materially. This must be taken into consideration in distributing storage expense. It will be well, at this time, for the reader to review our August article on expense distribution.

You will note that practically all indirect expenses must be considered when finding storage costs—payroll, rent, advertising, light, salaries, fuel, bad debts, insurance, depreciation, telephone and telegraph, association fees and dues, printing and stationery, repairs and alterations, employment and welfare, taxes, power, entertainment, rebates and allowances, law and audit, office supplies, storage supplies, postage, trade papers, donations, loss and damage, sundry petty expense. All these items help to make up storage expense.

Your total expense per month, divided by the number of storage spaces, will give your storage expense per space per month.

Remember always that supply and demand and local conditions fix your storage rates, and if the spread between storage revenues and expenses does not show a satisfactory margin, the fault is invariably in your organization or expenses and not in the rate.

It is only by giving special service that the garageman can expect to receive a premium over standard storage rates. With no direct charges, your storage department should be the most profitable department of your garage.

Storage accounting is simple and requires little time and few forms. Most garages use storage tags for transient storage only. The most commonly used form is shown in the illustration.

This is a two-piece tag. Some garages find it convenient to use a three-piece tag, all three pieces being numbered. The center piece is the office record. This is filed in a closed file with the claim check when the car is taken out of storage.

Storage stalls should all be numbered or lettered.

Regular storage is usually taken care of on a board in the office, having hooks to hold brass tags. These hooks will also hold tags covering instructions regarding cars in storage. The office portion of the transient tag is often kept on these hooks.

For "regular" storage and "dead" storage, a storage record should be kept showing all the details of the storage account—when opened, the rate, payments, when to bill, etc. An ordinary notebook will do very nicely for this purpose.

A regular sales ticket should be made out for storage charges, especially regular

storage. It is advisable to give the transient a sale slip also, though many garages lump transient storage for the day on one sales slip.

To those sufficiently interested to furnish the necessary information, we shall be pleased to work out a monthly storage unit cost, and suggest a basis to distribute your expense to the storage department. We should know the value of the storage space used, the number of cars or stalls in the space and your monthly expense schedule.

Keep in mind the fact that the distribution of some of your expense items can be made specific; as, for instance, garage supplies, payroll—including nightman and floorman—repairs and alterations, printing and stationery, rebates and allowances, loss and damage to stored cars.

| | | |
|---|-----------------------------|--------|
| To be attached to Car | | Number |
| | | 1390 |
| Garage Storage | | |
| Name | | |
| MAKE OF CAR | LICENSE NO. | |
| MOTOR NO. | DATE LEFT A. M. P. M. | |
| CHARGES | | |
| Storage | Days @ | |
| Gasoline | Gals @ | |
| Oil | Qts. @ | |
| Washes | | |
| CHARGES ON | | |
| Repair Ticket No. | | |
| CHARGES ON | | |
| Tire Tag No. | | |
| Date Called for A. M. P. M. | Total Charges | |
| MOODY & ALLAN | | |
| 717 West 26th St. Minneapolis | | |
| Present this Check when calling for Car. | | |
| Claim Check No. 1390 | | |
| ALL CHARGES C. O. D. | | |
| Not Responsible for loss by Fire or Theft | | |

Storage Tag Form Which Is Most Commonly Used.

All business men are getting ready for the critical time of the business year, the closing of the books and the preparation of the financial and profit and loss statements, upon which is based, later, their income tax reports.

If we can offer you any suggestions along this line, we shall be pleased to lend our assistance, through the AMERICAN GARAGE AND AUTO DEALER.

Pacific Coast Exposition to Be Held in January.

Most of the 35,000 square feet on the main hall of the municipal auditorium, San Francisco, has already

been applied for in the sale of space for the Pacific Coast Automotive Equipment & Accessory Exposition which will be held January 21, 22, 23, 24, 25 and 26.

A number of associations are working hard toward the success of the exposition and many new and educational features will be the result. There will be working displays of all phases of the automotive industry, as it applies to repairs, replacements, etc., as well as to products in the process of manufacture. The working displays will be operated daily during the full time of the exposition.

The automobile owner will learn many things that will be of value in

reducing the cost of upkeep and repairs, on the car. Those in the automotive trades will be shown many things that will enable them to turn out a more satisfactory job at less cost to the customer. Tools, equipment parts, machinery and accessories will all go to make up the display of one of the most educational shows ever held.

The exposition headquarters, at 346 Hayes St., have been busy with special invitations which are being sent.

More attention is being paid to the decorations this year than at any previous exposition and the exposition will be one of the most attractive shows of its kind held in the country.

The Law, The Facts and The Garage

In Which Brown Finds that a Cancellation by Wire Is Undelivered Through Janitor's Negligence and Jobbers Insist Upon Payment for Shipment of Goods—Also that the Law Says "He Who Acts by an Agent Acts by Himself"

By Arthur F. McCarty

The course of events in the Brown Garage & Auto Supply Co.'s place had been proceeding for three weeks as serenely as a ship which sails a well-charted sea before a fair wind. Business was good and getting better and Elwood Brown was pleased with life and its affairs.

Then, one morning the drayman appeared with a shipment for the company, and when Brown was walking about the establishment a little later he saw spread out on the floor, a huge auto trunk, a specially-designed spotlight and other accessories which, some way, aroused in him a most uneasy feeling. When looked up, they proved to be the goods ordered for Claud Boys, the order for which was afterward cancelled!

"I thought we wired cancellation of that order!" exclaimed Mr. Brown in astonishment. "Didn't we?"

The stenographer hurried to the files and got the copy of the telegram and placed it in his hand. It bore a notation of the telegraph company which had handled it.

"Get the telegraph company on the 'phone, quick!" demanded the aroused proprietor.

"This is Brown—Brown Garage & Supply Co.," he said, talking into the instrument. "Please report at once on delivery or non-delivery of our wire to Jones & Smith, of Chicago, dated June 15th. Yes, I want to know

when and to whom it was delivered, as soon as possible."

When the report came soon thereafter it showed that the telegram had been delivered at the building occupied by Jones & Smith and been receipted for thus: "Jones & Smith, per John Finley." Mr. Brown immediately called the jobbers on long distance, asking why the cancelled order had been filled, also for instructions about the goods which, he added, "We are holding to your order."

Jones & Smith, however, disclaimed all knowledge of the telegram. John Finley, they stated, was janitor of the building, but was not in their employ, being hired and paid by the landlord, and since he had failed to give them the message they denied responsibility and would insist upon payment for the shipment.

"Well, this is a mixed-up mess!" ejaculated the now irate Mr. Brown as he wiped his heated brow upon conclusion of the telephone conversation. Then, after reflection, "Lawrence happens to be here—guess I'll have him come down and straighten me out and not bother the lawyer just yet."

Mr. Brown related the facts to his son, then asked:

"Now, do I have to pay for those goods?"

"It looks as if you would, Dad," answered the young man. "You see you made the telegraph company your

agent for transmitting the cancellation, and their failure to get it to the jobbers is your own failure in the eyes of the law, for 'he who acts by an agent acts by himself.'

"I doubt if the telegraph company is liable on an unrepeatd message. That janitor is the only one clearly liable and a suit against him would probably be fruitless. If you had had the telegram 'repeated,' now, according to the fine print on the back of the blank, the telegraph company would be liable for any damages."

"Whoever reads that fine print? I don't."

"It would be advantageous for every person using the wires to read it, as the companies accept messages under the conditions set out there and that is their contract," said Lawrence.

"Well, I'm darned if I want to pay for those special goods, probably unsalable to anyone else for months if at all. Nelson!"

The salesman drew near.

"Just what did young Boys say about paying for these goods?"

"Said he'd have all the money ready when they got here."

"Say, Dad," interjected Lawrence, "maybe you're worrying over nothing. You have no reason to feel that there's to be any loss on these goods; at least not yet. I'll bet Boys is all right and will come in and pay for the stuff."

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A Home Broo Party and a Grees Fite

Chick and Polo Had a Home Broo Party and Nearly Lost Their Jobs Becaws Persy Blabbed—When Its Booz Youre Talking About Theres No Fool Like a Yung Fool—Sum Site, that Grees Fite, an Persy Wuz the Star Acter

By Frank Farrington

Hows the drug bizness in old Pink-vill? Are menny of the feller citizins bying hops nowadays to get lit up with by making home-broo?

Speeking about home-broo, there was a littel home-broo party in our shop the other nite. Chick and Polo was the gilfy fellers and Persy he was as gilfy as he cood get, but I gess he diddent get in as far as he wanted to.

Bob found em out. Chick and Polo had to work late on a job for old J. B. Cortvelt, one of our best customers, and I gess they must of got weery becaws, the way Bob doped it out, Chick had sum stuf heed bin making out there nites after the shop shut up.

It was half dandy lion wine and half home-broo and half elderberry wine, and I dont kno what all. Chick had bin working at it a long time

and haddent used enny yet. He was just waiting for it to get rite. It must of bin rite that nite becaws Bob sed it had a kick like a ellyfunt and a bite like a snappin tirtel.

Bob had bin off driving sumwhere and he drove in and he herd sounds of revvelry and he went back in the shop and there was Chick and Polo having what Polo sed was a grees mach. Eech feller took a pale of grees and tride to see how much he cood thro on the other feller while the pale lasted.

Gee, Bob sed Ide awt to of seen it and I wisht I had. They was sites and so was old J. B.'s automobileel. Persy he was hid down behind sum boxes soking up the rest of what was left of the dope theyd bin drinking. Bob sed he thawt Persy had cum in after the other fellers got lit up or els they never wood of let him in a tall.

Bob tride to stop the grees fite but they both began to throw grees at him, and Polo he got Chick to fill 2 grees guns and they sed they was going to put a grees barrij behind Bob so he coodent get away, but Bob beet it and shut the shop dore and lockt em in and he kept em there till they got kind of a littel sens in their heds and sed

told the boss on em, told him they was soused. And it seems they got sumthing together on old J. B.'s car wrong before they got so bad they stoppt work and it cost em fifty bux to settel. The boss wood of fired em both and Persy too only Bob sed all he cood and Persy's mother invited Missis Hecker to a party so he calld it off.

I gess Chick and Polo lernd sumthing becaws I herd the boss tell em: "So you see they aint enny feller whooz got good judgment when heez had a drink or 2 in. You wassent drunk when you fixt that car, but you had a drink or 2 and lost your judgment. You yung fellers cant take one drink and let it go at that and youd never get so you cood. If yung fellers had bin that way and cood take a drink and enjoy it and not take another, then there wood-



Polo and Chick Grabbd Persy and Laid Him Down An Rolled Him Over and Over In the Oil. Gee, Pete, I Nearly Dide.

theyd be good and Persy was asleep.

"You going to tell the boss?" Chick wanted to kno while they was cleaning up old J. B.'s car and Bob was helping em.

"I sure am," sed Bob. "Nothing like this is going to happen under my noze and not get reported."

They beggd and beggd and Bob saw they haddent dun enny dammij only used up about three dollers worth of grees and he sed, "Well, youre a fine pear and Ide awt to make you cum cleen on this with the boss. but Im going to giv you a chanse. Pay up for the grees and take Persy there home and spank him and put him to bed and prommis me youll cum and get my permisshon before you start ennything like this agen and Ile let you go on good behaveyure."

But Persy blabbd. They treeted him ruf getting him home and the boob

ent probably hav bin enny prohibishon. But when its booz your talking about, they aint enny fool like a yung fool."

Well, Pete, booz dont meen ennything in my yung life. Im diffrent from theez fellers that say they can take it or leev it.

I dont kno how much longer Persys going to last before the boss fires him agen. Heez getting so he dont kno a thing. He dont even suspect ennything. He was drawing sum oil for a man today and the man wanted a 5-gal can filld and it was at noon hour when the shop was emty and just Persy and me was around the place. Well Persy put the 5-gal can under the spout of the oil barl and it was pretty thick and run pretty slo, so Persy thawt heed cum back in a minnit and he went to get sumthing

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Your Lien Rights for Repair Work

Garagemen Who Repair Cars for Irresponsible Parties Are Afforded Protection for Value of Services—Right Does Not Survive When Car Leaves Repairman's Possession—How to Protect Your Interests at All Times

By Chesla C. Sherlock

Young Gordon Parsons rushed into Sanderson's garage the other afternoon and hastily demanded: "Got the boat fixed up yet?"

"Yes, it is all ready to go," said Sanderson, evenly. "The bill is \$28.57, and there is a back account amounting to \$52.30. You can have the car when you pay in full."

Young Parsons looked a bit crestfallen. "Oh, come now," he protested, "I'm in a hurry. Charge it to the Old Man, but let me have the car."

"I can't do that," replied Sanderson, "Your father has refused to pay any more of your bills, and he expressly notified me that since you came of age I must deal with you on your own responsibility. You have not paid the old account, and now I must exercise my lien rights on the car until you have paid up in full."

"I can't pay it all," protested the youth. "I've only got \$35 and I must have the car tonight. Suppose I pay you today's bill and you let the old account drag for a week or so."

But Sanderson was firm in his resolve to stand his ground. He had waited too long for his money and he had learned just enough law to know vaguely that the law gave him a lien right on cars he repaired for the reasonable value of his services, so long as he retained possession of the car. Hence, all proposals to separate him from the possession of the aforesaid car were not enthusiastically received by him.

Young Parsons was desperate. The fact was that he had planned a "party" for that night with some of his cronies and the party depended entirely upon his car. The upshot of the matter was that he went to one of his chums in a bank, who drew a salary and pretended to practice law on the side. He laid the whole matter before his friend.

"Well, old Sanderson has got you on the hip for the \$28.57 all right," said his friend, who had not forgotten all of his legal knowledge. "But he can't expect to hold the car for the account amounting to \$52.30. The lien rights on that bill have been lost. The

only way Sanderson can hold the car for that account, in our state, is for him to sue you for the amount and attach the car, but he has no lien rights on the car for it.

"The law attempts to give every mechanic who produces an article for another for hire, or who performs services upon articles brought in by the customer for hire, a lien on the article until the reasonable value of his services has been paid. This applies to all repairmen, tailors, cleaners, dyers, materialmen, carpenters, builders, and the like. It applies also to garagemen.

"But the law stipulates that the right to this lien will endure only so long as the repairman retains possession of the article. If the tailor stitches your suit for you and gives you back the suit, he has no lien on it, but he can keep the clothes in his possession until you do pay, if he wants to do so. The garageman has the same right. He can hold your car until you pay up.

"Possession, in this case, is the life of the lien. So long as the repairman retains possession the lien survives. But it fails when he releases possession of the article. That is why Sanderson's former bill against you can not be enforced by such a lien."

"But," interposed Parsons, "Sanderson has the idea that, since he has gotten the same car into his shop again, he can hold me for the whole amount of his bill. I offered to pay today's account and he wouldn't have it."

"Well, we will go over and see him about it," added the friend, as he reached for his hat.

Sanderson listened patiently to the claims of the two young men. An element of doubt crept into his mind and he was fair enough to admit it.

"You two lads may have the best of me in this argument," he said, "but I won't believe it until the judge tells me so. I'll just call up the judge now and leave it to him." A relieved smile crept into young Parsons's countenance.

Briefly, Sanderson put the case to

the judge. His jaw tightened noticeably. "Huh, that so!" was his only comment. He turned to the boys.

"Judge says you are right. All right, pay the \$28.57 and take the car. I was a durned fool to ever let you talk me out of taking the car out of the shop the first time. I lost my lien rights when you took it out, so the judge says, and they were not revived when the car again came into my possession. But mark this, young man, you are not going to put me off much longer on that account! I have some other legal knock-outs up my sleeve that will bring me either the money or the car."

The two young blades climbed into the yellow sport car and slid away, as Sanderson turned to the telephone and called up the judge again.

"Better stay away from his shop from now on," counseled young Parsons' friend, "if—if you want credit."

Parsons nodded. "What," he asked, do you suppose that old sucker is going to do to get his money?"

"I haven't any doubt but that he will file suit at once and attach your car."

"Well, it would take a month or two to try the case and I may get my hands on the jack before then."

His friend shook his head, sadly. "No, they will attach your car the minute the suit is filed and you won't be able to touch it until the suit is decided. I think that is what Sanderson is going to do and he will probably do it this very afternoon. You had better keep hidden today if you want the car tonight, and keep the car out of sight! I haven't any doubt but that you will be 'parking' it in the sheriff's garage tomorrow for indefinite storage."

Parsons impulsively shot in the gas, as he growled, "It's getting to be one devil of a world, isn't it?"

"Yes," replied the other, "for the fellow who doesn't pay as he goes!"

And Parsons, for once was thoughtful as he considered the possible loss of the car through his indebtedness.

WHY NOT MAKE IT A PAY-UP WEEK?

(Concluded from page 12)

No doubt, among his accounts, the dealer will have those to whom he does not desire to extend further credit until their accounts are settled. For use in these cases, he might have a special letter prepared to be mailed to these customers, stating that they will be expected to make settlement of their accounts during this week and that no extension of time will be allowed.

This first letter to these particular customers may be followed by a second letter which may be mailed the latter part of the week. This letter should call attention to the fact that the accounts still remain unpaid and that, unless paid by the close of the week, they will be placed with the store's attorney for collection.

Of course, not all customers will respond to this but the dealer might adopt the plan used by a northern merchant with splendid success in handling delinquent accounts. This merchant's father lived in a distant city and he had prepared a special letterhead, upon which appeared the imprint of a fictitious collection agency in the city in which his father lived.

A special letter was prepared and addressed to each of the delinquent accounts and the whole batch expressed to his father who mailed them back to the customers. Being post-marked in the distant city, the customer would immediately think that the merchant had placed the account with the collection agency as implied by the letter-head. A series of three letters was employed and the merchant found them very effective in collecting delinquent accounts.

Properly handled, this individual "Pay-Up Week" should prove a real stimulus to collections and be an effective means of speeding up collections.

A HOME BROO PARTY AND A GREES FITE.

(Concluded from page 15)

from the offis and wile he was there the tellephone rung and he anseerd.

It was sum jane wanted to make a date with him I gess and Persy is pretty eezy for ennybody like that, and I spoze he diddnt think he was tellefoning very long or els he forgot all about what he was doing. By and by he stoppt talking to this jane and by that time heed forgot what he cum

into the offis for and that he had enny oil can being filld that a man had left there.

So Persy diddnt go back in the shop and when Chick and Polo cum in from getting their lunch, good nite! There was a noah flood of oil in the shop and the barl was emty.

"Who dun that?" yellt Polo.

That waked Persy up out of his transe and he cum a running to see if his oil can was filld yet and he sed, "O I forgot all about that oil."

"You lobster!" sed Chick. "You meen to say you went off and left that oil running like that!"

Persy sed heed forgot it. Then Chick and Polo talkt sum langwij that theyd lernt sum place besides at the mooveys and Polo sed, "Lets giv that bird a lessun in memry so heel remember this and never do it agen," and he and Chick grabbd Persy and laid him down and rolld him in the oil. Gee, Pete, I neerly dide. Did you ever see ennybody blowing bubbels in oil on the garaje flore? Sum site.

Then he got up and slippt down 2 or 3 times and nobody was sorry for him and his ma wassent there. Polo grabbd a inner toob all blode up and threw it at Persy and sed "Grab the life perserver old top!" But Persy just crawld out onto dry land and peeld off his cloze and put on a over-haul soot and beet it and that was to-day noon and Persy aint back yet to-nite so I dont kno how heez getting on.

Well good by old sassyfrass and sinnymun.

Your oil rite frend,
BILL.

Pamphlet of Bureau of Standards Gives Specifications for Tires.

During the war, the Bureau of Standards undertook an extensive investigation of tires and tubes with the object of preparing specifications covering such material for military use. This work was highly successful and, as a result, numerous branches of the government adopted the bureau's specifications.

Circular 115 of the Bureau of Standards, obtainable from the Superintendent of Documents, Washington, D. C., at five cents per copy, will soon be ready for distribution and consists mainly of a revision of the specifications prepared by the bureau and now used by the War, Navy, Treasury, and Post Office Depart-

ments, the Panama Canal, and General Supply Committee. These specifications were recommended by the U. S. Interdepartmental Committee on Specification Standardization on June 6, 1921.

A tentative draft of the specifications was submitted to a large number of representatives of the tire industry, including the Rubber Association of America and, in the revision, careful consideration was given to their recommendations. The specifications are divided into three parts—pneumatic tires, solid tires, and inner tubes—and contain a detailed description of the physical and chemical requirements.

In connection with pneumatic tires, the character and strength of the fabric, the composition of the friction compound, width and weight of the fabric for the breaker strip, the compound from which the cushion is made, and the quality and quantity of the rubber in the tread are carefully considered. The construction of the side walls and the bead, as well as the tire sizes, are likewise specified. A mileage of 6,000 and 8,000 is required for fabric and cord tires respectively.

In the case of solid tires, the composition of the tread, its strength and method of fastening to the base band, and the chemical analysis of the base band, together with its tensile strength, are specified.

Analytical and physical requirements are laid down for inner tubes which are divided into three classes—pure gum, red antimony, and compounded tubes—the latter to be used only in 6-inch or larger sizes. In connection with the tubes, minimum diameter, length, thickness, volume of rubber and inflation test for the different sizes of tubes are specified.

THE LAW, THE FACTS AND THE GARAGE.

(Concluded from page 14)

And that is just what happened. Mr. Brown had a hearty laugh over his borrowed trouble, but he realized that the experience was worth while for future guidance. And he admitted to Frank that the law course was paying its way, adding: "Between the law and the facts I managed by good luck to get out of trouble that never existed." And he chided himself a bit for his lack of faith in the primary impulses of human nature, which, mostly, are honest.

Modern Radiator Repairing and Care

Pennsylvania Firm Makes Radiator Repair a Fine Art—Products Are High-Grade in Every Particular—A Few Suggestions for the Proper Care of That Most Important Part of Car, the Radiator—Anti-Freezing Solutions

By C. H. Thomas

In West Chester, Pa., about 25 miles from Philadelphia, there has been in operation for the past several years a modern radiator repair and manufacturing plant which, for superior goods and expert workmanship, is said to have no equal anywhere.

This three-story factory is operated by the L & M Mfg. Co., under the able supervision of Henry A. Lasko. Here they are building radiators for automobiles—both tractors and trucks being included in the types made.

The study and application of radiator construction has been a source of much experiment in recent years, and but few places exist today which have gone into the matter any more thoroughly than the L. & M. Their products are high-grade in every particular.

A radiator that will not burst in case of freezing must have some salient points in its construction to recommend it to the motor-wise. These radiators are fully guaranteed to do this or money will be refunded.

In the factory are all kinds of modern machinery for the quick delivery of radiators, as well as for the quick and efficient repair of worn and injured radiators. They come into this shop in all sorts of shapes and conditions. Each one is carefully gone over and dismantled so that the workmen can get at the parts and mend them in the best way possible, considering the condition of the radiator.

There are a few things about a radiator which will not be amiss in this article, which Lasko has gleaned from many years in the business and which he is glad to pass on to his fellow workmen.

The radiator of an automobile is one of the most important parts of the car, as it concerns the long life of the engine. Due to the fact that the temperatures of combustion run between 2,000 and 3,000 degrees and that a considerable amount of the heat is carried away through the cooling system, it is important that the system be kept in good condition.

A heavy coat of paint hinders the heat transfer on account of curling. A very good paint is made by using lampblack and gasoline. Occasionally the core should be cleaned to remove the dirt which lodges in the holes of a honeycomb or the fins of a tubular radiator.

It is sometimes advisable to wash the

will prevent freezing without injuring the engine or the radiator, or that will not lose its non-freezing properties after continued use; also one that does not change the boiling point of water when dissolved in it.

Kerosene has a lower freezing point and a higher boiling point than water, but the inflammability of its vapor makes it dangerous to use, and

its high and uncertain boiling point might lead to serious overheating of the engine or even the melting of the solder in the radiator. It also has a marked effect on rubber parts.

Most of the anti-freezing solutions sold under trade names have a calcium-chloride base. The calcium-chloride compounds exert a greater corrosive action than water on the engine jacket and on the solder in the radiator. Tests have

shown that calcium chloride is simply an experiment. If small leaks occur in the radiator and the solution comes into contact with the spark-plugs or ignition wires, a short circuit is liable to result. Therefore, this compound should be used with caution—if at all—on account of its great corrosive action.

Alcoholic solutions do not exert any greater corrosive action than water alone. Solutions made from wood or denatured alcohol seem to be the most desirable anti-freezing solutions to use. The table below shows the approximate point at which the different alcoholic solutions freeze:

20 per cent solutions freeze at 15 degrees above zero.

30 per cent solutions freeze at 8 degrees below zero.

50 per cent solutions freeze at 15 degrees below zero.

A solution composed of 60 per cent water, 10 per cent glycerine and 30 per cent alcohol is very often used. Its freezing point is eight degrees below zero. Although glycerine tends to do away with evaporation, the alcohol will evaporate much faster than water. The solution will become weak and ineffective unless more alcohol is added from time to time.



Modern Radiator Repair and Manufacturing Plant of L. & M. Mfg. Co., West Chester, Pa.

system with a solution composed of one pound of lye dissolved in five gallons of water.

First, drain the system and fill it with this solution. Run the engine for about 15 minutes and, after shutting off, drain and refill with clear water. Repeat this operation and refill with clear water. Be careful not to speed the motor when the solution is in it, as it will injure the paint if carelessly used.

Examine the radiator and, if it is a tubular type, see that none of the tubes are pinched, as plugged air cells or tubes decrease the efficiency of the radiator. Also, never plug an overflow pipe.

The circulating system should be filled with an anti-freezing solution as soon as cold weather sets in. It is not safe to rely upon draining the radiator when returning from a drive and filling again when starting out. In extreme cold weather, or when driving against a cold wind, the water may freeze even after circulation starts. Furthermore, if one or more tubes have become clogged with dirt, the water will not drain out.

Freezing generally results in a leaky radiator or a cracked water jacket. The ideal anti-freezing compound is one that

Where Are the Faults in My Business?

Good Accounting System Discloses Department That Is Eating Up Profits—
Record of Every Transaction Should Be Kept in Order to Know Costs and
Locate Profit Leaks—Accurate Stockroom Records Are Vitally Important

By Wm. G. Eiben,

Vice-President, Comfort Printing Specialty Co.

These are changing times. Business conditions have changed rapidly during the last year. Every business must be adjusted to meet the changing conditions of 1922, whether the business be selling and servicing automobiles or running a dry goods store. Many merchants have already adapted their business to the times. The same is true of some automobile dealers; others have not. Also, some dealers who, as long as business came rolling in easily, rolled in with the great wave of prosperity but likewise rolled out with the wave.

Now things have changed and are changing. In the days of frenzied buying, you could not tell the good dealer from the bad dealer. It took no effort to sell a man a car. He just came in and bought. From now on it is going to be a case of selling the customer and the good dealer is going to have his innings. How strong he is going to "bat" in 1922 depends upon how well he has his business in hand and on how well he can change it to meet the changing times.

Know Where Your Business Stands from Day to Day.

The lesson that commercial failures have taught us is one that every merchant can take to heart—one that he can use to his benefit. The retail automobile field is fast learning the need of complete records. The failures in automobile garages and shops have reached a high proportion, and many of these failures are found to be due entirely to lack of that which records alone will bring. The retail automobile man, whether operating a garage, repairshop, or agency, or three of these departments, is after all a retail merchant.

The merchandise is largely his service, but he, like any other retail merchant, must make a profit of the merchandise he sells and like any other retail merchant, he must know the cost of his merchandise before he can know whether or not he is making a profit. Every up-to-date merchant in any line of trade has a record of the cost of his merchandise. It is from this known record that he figures his profit as much as the selling price.

The retail automobile man, dealing largely in service, has a more difficult task than the retail merchant to whom he sells the manufactured product. Both must know their costs, but the retail automobile man cannot have his costs presented to him in ready-made fashion. He must determine from conditions within his own shop just what his costs are; he must be able to determine from each job just what the cost of

each particular job is. Know your costs and you know your business. Have a record of every transaction and you know that there are no profit leaks. If every sale carries a legitimate profit, you are headed toward success.

Records Give an X-Ray View of Your Business.

One sale at a loss will knock the profits out of three or four other sales. One department being operated at a loss is an

The dealer who expects to get through 1922 successfully must, above everything else, do one thing—he must have the right slant on his business and must know exactly where he stands at all times.

He must be in such a position that he can go to his banker at any time with a statement that will show him he is keeping close track of all receipts and disbursements and, when the end of the year comes, he must be able to show to a penny what his actual profit or loss has been. Only in this way will he be able to build up his establishment on a strong foundation.

It is true that dealers in our larger cities, as a general thing, have pretty good systems of accounting and know where they stand and which way they are headed but many dealers in the smaller country towns have not as yet been sold entirely on the necessity of keeping a set of books and records for the maintenance of their business. This article will show why money is lost to the dealer as a result of not keeping an efficient record of his business.

unfair burden to the other profitable departments. There is only one way to get the inside of this thing of profit and loss—that is, to take your business to pieces and examine it department by department. You should get an X-ray view of your business.

Let us start with the repair department. In no other department are complete records as necessary as they are in the repair department, for in this branch of work no two jobs are identical and the consequence is that the cost of every job must, of necessity, be individually determined. Unless this is in some way done, it is impossible to tell whether the department is making an adequate profit—whether your charges on some jobs are unreasonably high and on others not enough to cover your actual costs.

The facts to know whether or not your repair department is being operated on an actual profit basis are obtained from dividing your repair department into two broad divisions of cost. The first is time—the second is material, usually consisting of necessary replacement parts—and so, in order to determine the cost of any particular repair job, it is necessary to know exactly how many hours of time were put in on the job and what material was used.

The records of a repair department should do more than account for time and material on any particular job. These records should enable you to keep tab and judge the value of each and every man in your shop. You cannot personally supervise all the work all the time but, with proper records before you, you can tell exactly how every dollar was spent and how every man has engaged his time while in your employ.

In connection with your repair department, the most vitally important department in which much money can be gained and more lost is the stockroom. Your stock, extra parts, accessories, etc., are as vital to you as money in the bank. In the first place all of this stock costs real money.

Like unto the bank, your stockroom cards are your bankbooks. Your requisitions take the place of your checks. The checks show you how much money you have drawn out of the bank and your bank book gives you the balance on hand. Likewise with the stockroom card; the amount of material on hand and the requisitions show you the amount of material which has been drawn out of your stockroom and for what purpose it has been applied.

Should the tire department be handled separate from other stock? Experience has proven that it is advisable to handle all tire business as a separate and distinct department. There are several reasons for this.

In the first place, casings and inner tubes run into money fast and as the stock in this department deteriorates rapidly, it is necessary to move goods in the order that they are received from the factory. Another reason is that adjustment has to be made on tires, so it is necessary—if you are to play fair with the customer—to have a history of every tire disposed of. You should by all means have a stock record of your tires to show the number, the kind and size of casings and inner tubes on hand at all times. You should be able to tell exactly when each one of these were received from the factory. You should be able to tell

exactly the number and kinds of tires that you have sold.

All Tire Troubles Not of Road Variety.

Without this information you have no standard upon which to base your order from the factory. You have no way of telling whether the stock on hand is going to be adequate to meet your needs or not. There is a lot of money in tires. Are you getting your share? All the tire troubles are not confined to the road. The average dealer usually has his tire troubles too; not punctures nor blow-outs, but from a number of things that cause profit leaks in your tire sales.

You cannot intelligently dispose of tire stock unless you have some means of knowing at all times just how many tires you have in stock. Eliminate chances for loss. You can avoid these profit leaks if you know exactly the number and size of tires that you have in stock. You should know exactly when each one was received from the factory and know exactly the number and kinds of tires that have been sold and when they were sold. Many dealers just guess all these things and possibly get by, but they could avoid a lot of trouble and make bigger profits if they will only decide to quit guessing and determine the low cost.

Knowledge beats guess-work at all times. It isn't so hard to get the knowledge, either, and the very kind of knowledge that will increase profits. Proper forms should be used on each one. You should have a tag on each tire which will show the make and size of that kind, the thread number, etc.; you should have a stock record showing when it was received, when it was sold, etc., giving the serial number.

You should also have proper tire-repair records which will show you the amount of the cost of each job. A very simple system of all this information can be had at a very small cost.

Although the cloud of business depression is slowly passing away and the silver lining is again showing itself in the year 1922, nevertheless, you have to dig in after your sales if you want to be on the right side of the ledger in 1922; so, therefore, go on and dig and boost for all sales. Sales are made by a combination of information and

Payroll Record Form Showing Method of Distributing Wage Charges.

knowledge and from the personality of the salesman. There is, perhaps, no way of furnishing a personality, but there is a way

Can You Answer These Questions About Your Business?

Where do I stand today? (Of the most vital importance!)

How much profit did I make during the year?

Did I make any—did I just break even, or did I lose?

Could I prepare a business statement that a banker would accept?

If I had an opportunity to sell my business, would I know how much it is actually worth?

Would I be better off if I sold my business and accepted a good paying proposition?

How much money have I tied up in machinery, equipment and tools?

Would I make more actual money by cutting out some of the things that I am doing now?

Does the money I have in the bank represent my profit? It certainly does not. You must know your business and, in order to know your business, you must have facts at all times at your finger tips.

of gathering all the information and acquiring the knowledge.

Any salesman, who must use all this energy in trying to remember things that

ought to be put down in black and white, has just that much less energy to do the actual sales work. Then there is the manager side of it. The owner of a business should know all about the sales activities of the selling force—how much each man is selling; how many prospects he has called upon; how many of these prospects he is likely to sell within the next 60 days; how many of this type and how many of that type of car can reasonably be sold during the season; what accessories it would pay to stock heavily and push.

One more thing that the dealer is very much concerned about is: If one of his salesmen should leave, would he carry all the names of his prospects away with him, locked up in his own head, or would he have all the information in his own office?

A watchful eye should be kept on your battery department—whether you can operate it independently or as a department on account of the profit leaks. A battery is repaired, exchanged, or recharged, and you ought to get the proper charge made for this particular service. You should have a way of checking up to see that no more than the proper allowance is made for a battery taken in on exchange.

When a man rents a battery, you should always charge him for the full time in which he has it in his use and you should have a receipt for every battery taken out of your shop. Batteries are brought into your shop and taken out for so many different reasons, and the services of a battery department are of so diversified a nature that some of the profits are bound to be lost unless a record of every transaction is made.

All Records Brought to Final Accounting.

All the records of each department should be summarized for what is known as one final record, and that is a good accounting system.

You can speed up the work, save waste of time, and at the same time give better service, by using the proper forms and tags. These tags are the cost getters for you, and summarization of them ought to be put into a final book where complete record of every transaction ought to be made.

(Concluded on page 28.)

Form Used for Recording Sales and Showing Their Distribution.

How to Make the Drill Press Pay

Several Types of Metal Used in the Construction of Various Machines the Drilling Qualities of Which Must Be Thoroughly Understood to Get Most Out of The Drill Press—Knowledge of Various Types of Drills Important

By Gustav H. Radebaugh

Repairs on broken castings and damaged framework of power farming equipment will generally call for drilling of holes for fastening the patch. This type of repairwork is only one of a good many repair jobs done in the shop that require drilling.

When repairing agricultural machinery, it will be found that several types of metals are used in their construction. Soft and hardened steel, cast steel, cast iron, bronze, brass, malleable iron, and aluminum are all commonly used in their construction.

To get the most out of a drill press, the drilling qualities of these metals should be understood. This makes it possible to do repairwork on all parts of farm machinery.

Several types of power and hand-drilling machinery are used by tradesmen when doing repairwork. It is important for the repairman to become acquainted with these tools—it makes the planning and completion of a job much easier. Styles of these drills are shown in Fig. 1.

Use of Hand Drill.

The hand drill is one of the most useful tools in the repairshop for drilling holes up to $\frac{1}{4}$ -inch diameter. When drilling holes of small sizes, the drill must be driven at a

high speed to prevent the drill point from breaking.

Many hand drills are supplied with a set of 12 drill points, which are held in the wooden handle when not in use. This type of drill is much better for small drilling

than the combination post drill, as a greater drill speed can be obtained and the feed pressure is more easily controlled.

The Breast Drill.

When it is impossible to get the job to the combination post drill, when drilling holes $\frac{1}{4}$ -inch to $\frac{3}{8}$ -inch in size, the breast drill is used. If holes larger than $\frac{1}{4}$ -inch are being drilled to any depth in cast iron or soft steel, a $\frac{1}{8}$ -inch hole should be drilled first with the hand drill. This operation makes drilling with the breast drill much easier.

A spirit level is located on this drill to assist the operator in drilling straight holes. When making holes larger than $5/16$ -inch, considerable pressure must be applied to the drill to make it cut. The Armstrong Packer ratchet drill is designed for the larger sizes of drills. A brace is provided to support the ratchet and drills, the pressure being applied by the threaded nut on the top of the ratchet.

The Chain Drill.

When drilling holes in pipe work and, in fact, any job where a chain can be passed around the work, the chain-drill attachment is used. It is driven by an ordinary carpenter bit-brace. The feed to the drill is obtained by the screw arrangement which tightens against the chain. This tool will be found useful in drilling holes ranging from $5/16$ -inch to $3/8$ -inch.

Many styles and sizes of post drills are on the market, but the one provided with a hand and power drive with automatic feed

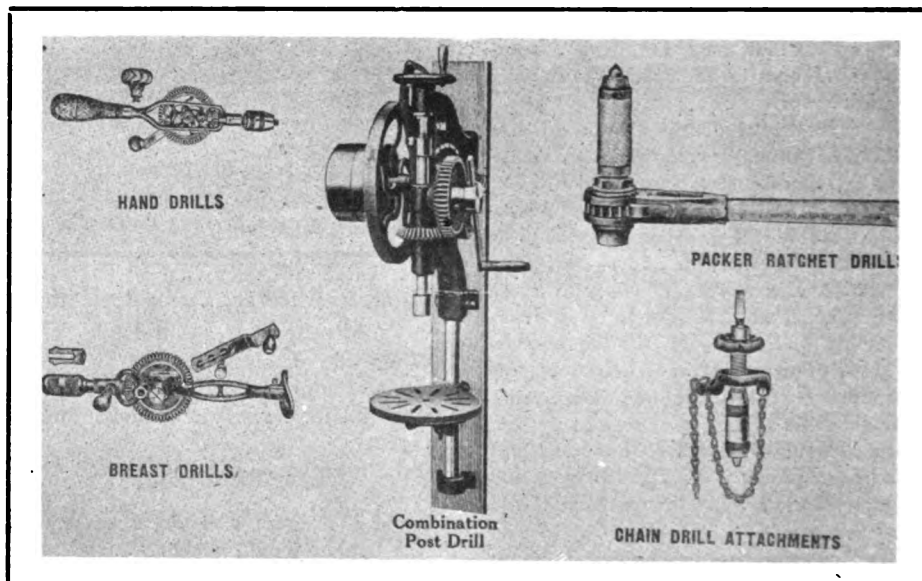


Fig. 1—Styles of Power and Hand Drills in Common Use.

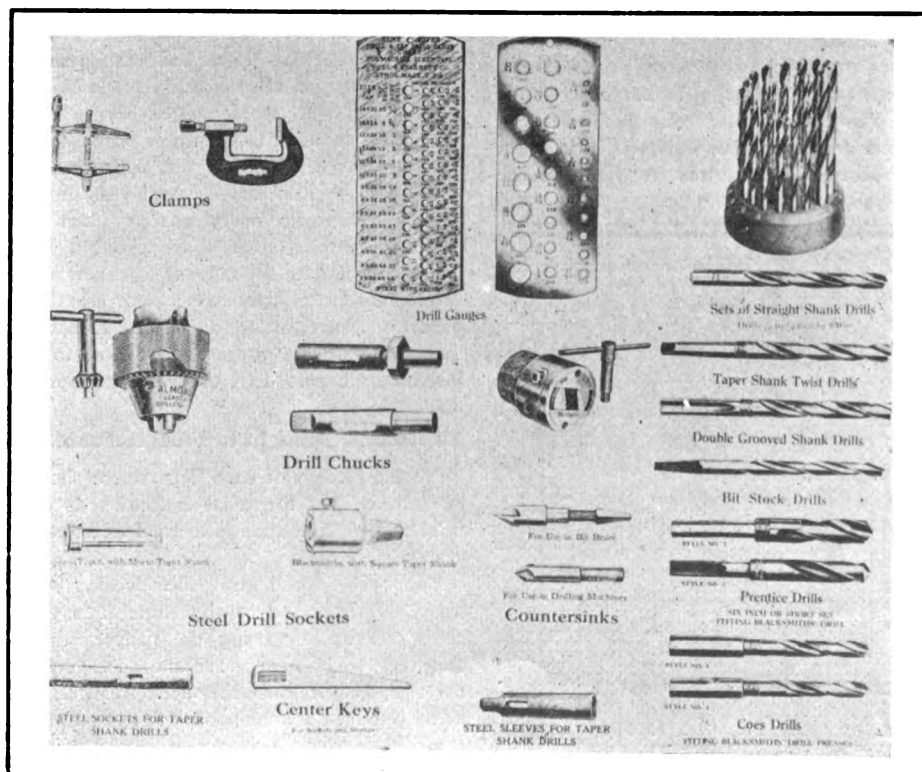


Fig. 2.—Showing Several Types of Drills and Drill Press Equipment.

will be found as effective as any. When it is not necessary for the average small shop to be provided with the best of these post drills, a medium-priced machine costing from \$13 to \$16 will give good service.

Drills and Drill Press Equipment.

To make it possible to get the best service from the post-drill press, a few

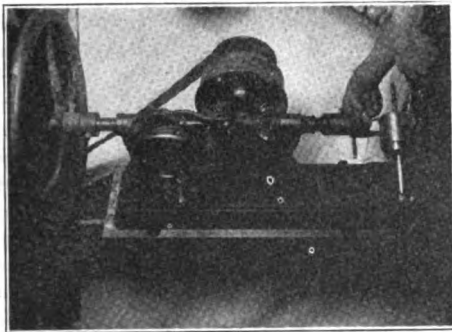


Fig. 3.—Selecting Chuck for Drill Press.

drills and tools must be provided. Fig. 2 shows several such tools. If the shop is provided with this equipment, the heaviest or most delicate drilling job should not be too difficult.

Post-drill presses of different design require drills with special shanks. Care should be exercised when ordering drills to be sure that they fit the press for which they were ordered. Notice the shank design on the Coes drill and the Prentice drill. The other four styles are standard, but they require chucks or holding sleeves and are not commonly used on this type of drill press.

The taper-shank drill is held in the drill-press spindle with the steel sleeve. This is the type of drill used in most of the commercial shops. The straight-shank drill is held in a chuck. They come in sizes from No. 60 on up. It is not good practice to use straight-shank drills larger than ½-inch. Chucks are provided with a shank that fits into the drill-press handle.

The straight-shank drills should be used in the small shop. Justification for recommending the use of the straight-shank drill up to ½-inch for the small repairshop is the

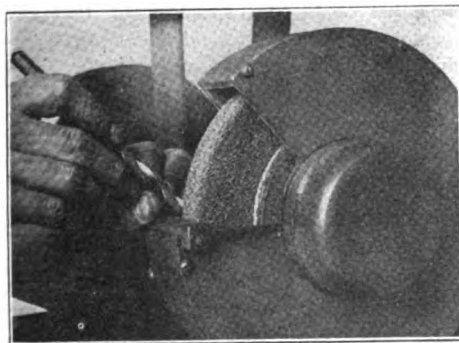


Fig. 4.—Grinding Drill for Steel and Iron.

large range of drill sizes for taps. The cost of this drill is also lower. If the shop is going to drill and tap holes for machine screws, such as are found on power equipment, it is obvious that the correct sizes of drills must be on hand.

The sizes of screws are somewhat confusing, as there are several standards existing. This often makes the task of replacing screws on repairwork an unpleasant and unprofitable job. To explain how the size of a medium screw is gaged and the drill chosen for the tap, we can remove a screw from a job and, by noting it in the drill-tap gage, as shown in Fig. 2, it is found that it fits in the hole.

On referring to the machine-screw list we find this is the body size for a No. 12-24 screw—meaning No. 12 size and 24 threads to the inch—requiring a tap drill No. 15. This means if this job is to be done, a straight-shank drill, as shown in the drill block set, must be supplied, as these sizes are not made with the special shanks.

These drills are sized in numbers ranging from numbers 1 to 60 and are sized to fit all standard machine screws. A very simple and convenient way of measuring these drills is by using the L. S. Starrett drill and tap gage, the same gage used to determine the sizes of screw, tap drill, and body drill. Notice the sizes of machine screws and the tap-drill sizes marked on this gage.

A drill used to drill a hole for tapping is called a tap drill. Another very useful

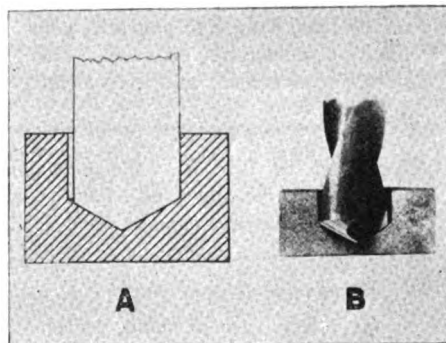


Fig. 7.—Correct Grinding Prevents Breaking Drill.

tool is the fraction drill gage. This is used to measure drills from 1/16-inch to ¾-inch by 1/64-inch. These gages are not expensive and may be found in the tool box of the commercial mechanic.

Flat-head screws require a counter-sunk hole. The countersinks shown are provided with a straight shank for a drill chuck and a bit-brace shank for the carpenter brace. For light countersinking, the breast drill is oftentimes used to drive the countersink.

Types of Drill Chucks.

In Fig. 3, three types of drill chucks are shown. The two chucks on the platen of the drill press can not be used in the post drill unless the spindle has been bored out so the taper-chuck shank will fit.

On this machine this has been done, and the little time consumed on this operation has been worth while. The practice of having a set screw on the spindle of a drill press is obsolete and is very dangerous. A tragic story could be written on the many accidents the set screw on drill spindles has caused.

The post drill should be clamped to the

post or wall with four ¾-inch carriage bolts with washers. It should be located so that the chuck will be on the level with the operator's chest. This permits free operation.

Getting Most Out of Drill by Proper Grinding.

Few operations on tools in a shop are more important than the grinding or sharp-



Fig. 5.—Change Angle for Brass Drilling.

ening of drills. To secure satisfactory performance, the cutting edges must have a proper and uniform angle of 59 degrees, with the longitudinal axis of the drill.

They must be of exactly equal lengths, and the lips of the drill sufficiently backed off or cleared. If this clearance is insufficient or imperfect, the drill will not cut. A very simple method of determining the clearance is to set the point of the drill on a flat surface, holding a rule parallel with the drill. By revolving the drill its clearance can be checked, as well as the height of the cutting lip, which should be equal.

When grinding a drill, support the drill on the index finger, as shown in Fig. 4. By doing this, a grinding balance and position is more accurately maintained. It is a good plan to have a drill in the shop that has never been reground, for use as a sample to gage by. Care must be exercised not to draw the temper on the drill when grinding. To prevent this, it is always a good policy during the grinding operation to place the drill in water to cool it. Endeavor to preserve the original

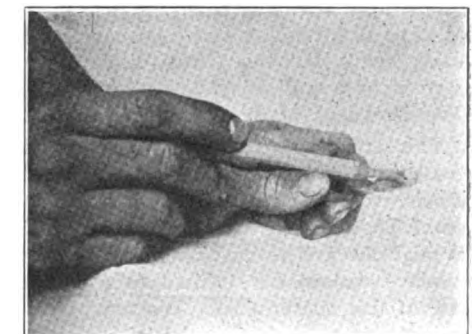


Fig. 6.—Drills Ground Like This Make Brass Drilling Easy.

form of the drill. It has been ground by the manufacturer to insure rapid and satisfactory work.

Many times, when a drill has been considerably shortened through use, the cen-

(Concluded on page 28)

Some Business-Stimulating Ideas

Duck Pond Display Found Effective For Advertising Waterproof Top Dressing—Selling the Chains—Courtesy, Reliability and Service Winning Trio for New York Accessory Dealer—First Analyze Your Territory

"Duck Pond" Advertising.

E. L. Miller, who operates a vulcanizing shop and sells automobile accessories and supplies at his establishment in South Grand Rapids, Mich., recently put on an advertising stunt that attracted considerable attention. The stunt was effective because of its novel method of demonstrating in a convincing manner the point which it was designed to bring out.

Miller handles a very good kind of waterproof top dressing. Because he knew it was good, he wanted to push its sale as much as possible. With a little ingenuity he planned and made a unique window display. The point he wanted to demonstrate was that the so-called "waterproof" top dressing was really waterproof.

This is how he did it. First he obtained a piece of light-weight canvas, about 1½ yds. wide and two yards long. Then he applied the waterproof top dressing to the canvas, covering all of one side of it except the corners and edges. These he left untouched so that it would be apparent to any spectator that the dressing had been applied to a piece of plain, light-weight canvas.

After the application of dressing was dry, he suspended the canvas loosely and flat-wise across his display window. Then poured water into it, thus forming a pool in the pocket made by the slackness of the canvas. At the toy counter of a local ten-cent store he purchased a small flock of little snow-white ducks and swans, such as are made to float on water in an upright position. These were placed on the surface of the pond formed by the water in the canvas in the window of the store.

Above this miniature duck pond he hung his placard which read: "Blank's Waterproof Top Dressing Holds Water In as Well as Holds Water Out." Of course, the background for this little display was formed by a wall of "Blank's Waterproof Top Dressing" neatly arranged.

This stunt was effective, not only because it attracted attention but because it proved conclusively that "Blank's Waterproof Top Dressing" was truly waterproof. It might be well to mention that the entire display window was utilized to push the sale of this one product. Too many dealers attempt to push the sales of a number of accessories in a single window display with the result that, as a rule, they fail to increase the sale of any accessory. Usually it is the best policy to boost only one article at a time.

The display which has been described can be prepared very easily and quickly and the cost of making it is slight. Ac-

cessory dealers in the smaller towns will find it very effective in securing the attention of people passing their display windows.

Made 'Em Think of Chains.

A window trim of an educational sort helped to put over the message of the tire chain effectively for one dealer. He had a large wooden device made up to represent an old-fashioned balancing scale. There were no pans but instead, at each side, there was an automobile wheel.

One wheel was shattered and beneath it on the window floor were several of its spokes. Needless to say, this wheel was NOT equipped with chains. There was a card on it which said:

DRIVING WITHOUT CHAINS

means fear, danger to yourself, your family, pedestrians, damage, lawsuits, inconvenience and even death.

Contrasted to this was the new and whole wheel on the other end of the beam. It was fitted with chains. Its card read:

DRIVING WITH CHAINS

brings safety, ease of mind, prevention of accidents or damage or loss.

Displayed about the window were a number of chains. The window caused many car-owners who went that way to stop and heed the lesson.

Tips on Used-Car Advertising.

It is estimated that from five to eight used cars change hands in the United States for every vehicle sold. The exact figures are difficult to obtain, for frequently the same car will change hands several times in the course of weeks or months. It stands to reason, then, that a great many people, either as private owners or as used-car dealers, find it to their advantage to advertise, in order to get in touch with automobile prospects.

In a certain city, where there are the usual number of garages and agencies for new cars, a number of them, as is often the case, take used cars in exchange. In addition to this, there are a couple of dealers who handle used cars exclusively.

The regular garages, and one used car dealer, all use the same method of advertising. This is to list the used cars

on hand by make, model, serial, or year. Sometimes they add a brief word of description. More frequently, however, there is just a list of six, eight, or ten cars—one directly under the other.

About half a line is given to each car, and the list is set in the center of the column. It makes a rather attractive looking advertisement but, for some reason or other, the results are not startling.

In contrast, we have another used car dealer who uses a different method which is entirely his own, and he easily sells three cars to each one sold by the other man. Naturally, he does not say much about this, for having made a discovery of a profitable nature, he is not in a hurry to tell his competitors about it. His method is as follows:

He never advertises more than two cars in a single issue of the daily paper, and he devotes an entire classified advertisement to each car. In each classified advertisement he uses such space as he needs—four, eight, ten, or a dozen lines, as may be justified in describing the vehicle.

Invariably, he gives the cost. The two cars given this publicity usually represent two different classes altogether—an expensive car and a lower-priced one. His idea is that the car which will appeal to one customer, will not appeal to the other, and he does not want to waste ammunition competing with himself. The result is that one advertisement for each vehicle usually sells the two.

Then he advertises a couple more. He reasons—and results seem to prove his contention—if a prospect reads of a car being in fine shape, with good tires on it and original paint unharmed or a new paint job entirely, is assured that it is in fine mechanical condition, and that there is a list of the extra equipment, that any person interested can visualize that vehicle and will know at once whether it is in his class or not as far as money goes.

In fact, he will not be satisfied until he sees the used car advertised, while the listing done by the other dealers of the type described will not awaken the imagination or interest in other than the mildest degree.

He finds, too, that using the price eliminates those who would only take up time and would not be prospects once they found the vehicle was too high-priced or too cheap.

The dealer who uses the classified advertising in this way, finds that he gets fewer inquiries.

A comparison of these methods gives food for thought.

"You've Seen Our Pictures."

Two men recently opened a garage and did considerable direct and newspaper advertising to make known that fact to the public. In all these advertisements photographs of both of the men were featured.

In the course of a few weeks, when their faces had become well known, they changed their advertisement and used a little catch phrase which linked up their former advertisements in a compelling way.

"You've Seen Our Pictures, Now Come and See Us" were the magic words that they used in all of their advertising. It was just a little idea, to be sure, but it attracted attention and that was what they were after.

Moving Window Display Inside.

A garage proprietor, who carried quite a line of automotive accessories, noticed that a great many people would come into his garage and ask him for something they said he had had in his window the week before. In many cases, they couldn't quite remember what it was, but they knew that it was something which they wanted. This gave him the idea of moving the replaced window display articles inside the garage every week.

He secured a large table and placed it at the front of the garage, out of the way but where everybody could see it. Then, in trimming his window, he would transfer the display to this table and let it do duty for another week while the new display did duty in the window for a week.

He found that people were reminded, by the display inside the garage, of something that they had seen in the window the week before and wanted. In that way, another boost was given to business.

Idealistic Service.

The well-known firm of Halbritter & Co., Inc., is one of the leading automobile accessory and supply houses of Auburn, N. Y. This firm started in a modest way several years ago at 24 Water street. They made a feature of courtesy, reliability and service—a winning trio.

Their loyalty to these ideals was not perfunctory. A call in person or a telephone message would always bring prompt, interested, intelligent service, and the firm and its employees had the happy faculty of impressing the public with the fact that they were not considering money alone.

They took pride in stocking supplies which they could stand back of and, even at the risk of losing a sale, they have proven themselves willing to give an honest opinion when asked, remembering that fair dealing makes and holds patrons. They have always been consistent advertisers and have taken space at local automobile shows, or taken part in other enterprises of a public-spirited nature.

With the idea of increasing service, it was decided to employ a young woman who was to go after business and not wait for business to come to the firm. This was something of an innovation, for the rest

of the local automobile accessory and supply dealers contented themselves with a good location, fairly attractive windows, and the usual publicity.

The firm of Halbritter & Co. reasoned it out that there was much trade which went begging or drifted elsewhere, as trolley lines radiated from Auburn to several larger cities. It was further reasoned that a young woman would receive an audience with women even more readily than a young man business solicitor, and that the suspicion of women customers would be disarmed also by a young woman of charming personality.

So it was decided to have a representative of this character work the city territory in the early spring just before the automobile season opened up and while the roads were still bad in the country. People would be thinking of getting their cars out, and would be in a receptive mood to consider what they would need for convenient operation during the coming season.

Later, the young woman was furnished with a small car and enlarged her field of activities to take in out-of-town car owners. This is strictly along the line of the modern policy of going after trade and not waiting for trade to come to you.

The rapidly-growing business called for increased facilities, and so a new store and shop has just been opened up at the corner of North and Garden streets. The new location has been completely remodeled along thoroughly modern lines.

A concrete structure has gone up, in the rear of which a vulcanizing department has been established with a separate entrance on Garden street. It was as vulcanizers that the Halbritter firm began. This part of the shop has been equipped for the most efficient service. A 200-ton hydraulic press has been put in, in order to handle the solid-tire work.

The store, where all kinds of accessories and standard makes of tires are in stock, faces North street and, as the location is a strategic one, an increased volume of business may be expected.

Analyzing Your Territory.

Not many days ago the writer was talking to H. A. Gunion, who was just opening a new battery service station in an Indiana town of some 12,000 people, and asked him if he did not feel "kindo' shaky" at leaving a good business and opening up in a new locality just at this time.

He replied that he was going after the business with the same methods which had made the old location so successful and that he felt very sure of the results in the new one, because he had proven out those methods.

When asked what those methods were he replied that he had first procured a reliable mailing list of every automobile owner in his territory, and had then sent him a personal letter—not a multigraphed one—telling the car-owner of his location and soliciting his trade in the future.

A couple of weeks later he mailed these same people a blotter, directing their attention to some national advertising of his battery which would appear in the next issue of the Saturday Evening Post, and which he felt might be of interest to them.

After this issue of the Post had come out, he mailed out another set of personal letters, with a copy of the Post advertisement inclosed. He also called their attention to the fact that he carried a line of small electric accessories which he was selling very cheaply and again invited their patronage.

The first month his business amounted to \$2.50! For the first eight months, though business began to come in slowly, he still ran at a loss. Then the effect of the consistent personal advertising began to tell and work grew until, at the end of a little less than two years, the station was doing something over \$8,500 per year, and ranking as the second largest battery service station in the town of 12,000 people.

Advertise With a Slogan.

Many large business houses of different kinds have found that a slogan is good advertising and a garage proprietor in an Eastern city, who did considerable advertising of various sorts, felt that if it was good for others it should be good for him.

"Repairmen, Not Tinkerers" was the slogan that he adopted. He used it on all his stationery and in any advertising which he did, and found that it made a lasting impression upon those who read it.

The kick which so many automobile owners express—that garagemen are not mechanics—was given a solar plexus blow by this slogan that helped to advertise this garageman's service in the right way.

Uses Inspirational Posters.

In a certain garage in Philadelphia inspirational posters are fastened on the wall opposite the main entrance—a new one with a vital message appearing each week, the change being made every Sunday night.

"I pay \$104 a year for the poster service," explained one of the owners, "for which I receive 52 in a year. They are worth much more than the mere price, as there is always a practical and improving message in them. They come in a size large enough to be read at a considerable distance and one is always in sight of the employees, who evince much interest in them.

The text is chatty and never 'preachy' in getting its message across—nor is it stilted like some of the inspirational homilies we read. Each poster is printed artistically, in two or three colors, and it cannot help striking the eyes of every person who enters the garage."

Here are some of the commanding titles: "Where Are My Tools?" "Who Pays the Loafer—You Do!" "Are You a Grouch?" and "What Would You Do in Case of Fire?" The text is usually half humorous, or whimsical in tone, and the point always seems to be fully appreciated by the employees.

Welding, Cutting and Brazing Practice

Torch Operator Need Not Depend Upon Fusion Welding Alone to Make His Outfit a Paying Proposition—Should Have Several Different Designs of Each Tool—Types of Torches Needed and Instructions for Their Care

By David Baxter

In preceding chapters, the principles and care of the oxy-acetylene welding torch and other necessary appurtenances thereto, inclusive of the gas supply and its conduction to the welding flame, have been discussed.

Having this much of the welding shop equipment, the torch operator is then in a position to do several other classes of work. He need not depend upon fusion welding alone to make his outfit a paying proposition—especially the welder who is operating in connection with an automotive repair-shop or garage, and he is the man for whom these discussions are written.

In fact, the oxy-acetylene welder is the logical mechanic for the handling of the different kinds of work described. By reason of his welding equipment, the torch welder is no doubt better fitted to do the work than any other mechanic, since he may combine it with his regular welding business. It might be well to say here, also, that there are many uses for the welding torch besides the actual fusing and joining together of metal parts. These we can take up later.

Now in describing and discussing other classes of work which may be combined with the regular welding business, it should be remembered that there are several different designs of each tool needed. Therefore, it might be confusing to describe any one particular make. Each manufacturer has some variation in design or construction, although all operate under the same theory. As in previous articles, therefore, the idea will be adhered to of considering information in general so that it may be applied to any or all of the different tools.

First, every welder—especially those interested in automobile welding and repairing—should have a special carbon-burning torch in his equipment for the purpose of removing the carbon deposits from cylinders and piston heads. This torch uses the same oxygen that is used in welding, so that no extra equipment is needed except the carbon torch itself.

Of course, separate tanks, regulator and hose may be designated for the purpose, but this is not necessary as it takes but a few minutes to unfasten the oxygen hose from the welding torch and attach it to the carbon torch. When the job is finished, the hose is again attached to the welding torch. The same regulator valve serves for both purposes.

Briefly, the carbon-burning torch consists of a valve, to one end of which is brazed or otherwise fastened a section of copper

tubing. Through this tubing, the oxygen passes to the spark-plug hole of the engine to be treated. This tube should be flexible enough that it may be bent to any curve in order to reach the farthest corners of the carbon deposit. The valve may be any kind which will hold the oxygen without leakage.

The whole contrivance should be light and strong but easily manipulated. The flexible tube should be 16 to 20 inches long and of small diameter. First, because there is often considerable pyrotechnic effect when the carbon is burned; second, because it is necessary to work the tubing through the spark-plug holes of the engine, and because the oxygen must be reduced to a very small stream in order to promote rapid combustion without overheating the pistons and valves of the engine.

It is no doubt better to purchase a carbon-burning torch from a responsible manufacturer, but an ingenious mechanic can construct one in his own shop if he so desires. The carbon-burning torch shown in



"Carbon Torch With Flexible Copper Nozzle Important Tool in Welding Shop."

one of the illustrations should furnish a clear idea of the general design and comparative size of the different parts.

Little need be said in regard to installation of this simple instrument, except that it is securely attached to the oxygen hose in order to forestall any danger of bursting loose while in service. A loaded oxygen drum carries 1,800 pounds of pressure.

Therefore, should anything happen to the regulator valve, an insecure hose connection might pull off and cause a bad fire. It might even cause the car upon which the welder is working to be destroyed.

The carbon torch requires but little in the way of cleaning or repairing. It seldom becomes obstructed and is easily cleaned when it does. If it is hung up after each job, no replacement of parts will be needed for years. In fact, it is one of the welder's tools that costs him practically nothing for upkeep. With it he can remove the carbon from a four-cylinder car in from 15 minutes to half an hour without any appreciable wear on the instrument.

Another torch which belongs to the outfit of any welder engaged in repairwork—whether it be automobile or general repairwork—is the oxy-acetylene cutting torch. A good example of this torch is shown in one of the illustrations. This torch has a circle-cutting attachment in place, to be used when cutting out circular pieces of steel or wrought iron from a few inches up to several feet in diameter.

The average garage repairshop will find the cutting torch almost as essential as the welding torch. They will find it faster and in many ways more convenient than a hacksaw, or a power saw, for cutting frames, fenders, bodies and even shafting and rods. Properly executed, the cut compares very favorably with a steel-saw cut.

And the cutting torch is handy in another way. In a pinch, the oxy-acetylene cutting torch can be used as a welding torch. If the welding torch happens to be put out of commission, the cutting torch will replace it on many kinds of welding. However, it is not recommended as a regular thing, since it is too heavy and awkward to manipulate all the time.

Like all gas torches, the cutting torch is in reality a delicate instrument in spite of its sturdy build. The accurate proportions required in relation to mixing and delivering the oxygen and acetylene to the flame make it necessary to see that the torch is carefully handled so that it will not get out of order. Unlike the welding torch, the cutting torch does not have a set of tips to be taken care of and changed with the different jobs. To change the capacity of the cutting torch, the welder merely changes the oxygen pressure.

But he must keep it clean, about the same as he would the welding torch—that is, the gas outlets become obstructed by bits of slag or flying metal. These shut off or decrease the volume of gas the same as in

the welding torch, with the result that the cutting becomes irregular. This is not so detrimental, as the cutting may stop anywhere while the crust is being removed and is taken up again as soon as the torch is cleaned.

This cleaning should not be done with a



"Cutting Torch Needs Cleaning and Care the Same as the Welding Torch."

steel instrument which is liable to mar or enlarge any of the orifices. When the slag scale is removed from the face or sides of the tip, care should be taken not to cut down the length of it as this changes the manufacturer's ratio until the working of the torch does not agree with the printed tables of its maker.

These tables should be posted in a prominent place and referred to at all times, or until the welder becomes sufficiently familiar with the torch to handle it by experience. A certain fraction of an inch of the metal thickness to be cut calls for a certain number of pounds of pressure on the gage and regulator. If this is not followed fairly closely, the results of the cutting action will not be satisfactory.

The modern cutting torch has three tubes for delivering the gases to the flame, but only two lengths of hose. Two of these are for the oxygen and acetylene of the welding flame. Or rather, perhaps, we should say the preheating flame, as that is what it is in this instance.

The other tube is for the high-pressure oxygen which causes what is called the cutting action, although oxy-acetylene cutting action is not cutting in the strict sense of the word, but is a very high rate of oxidization. The metal is really burned to oxide. It literally burns itself up. The metal furnishes the fuel and the oxygen promotes the combustion.

The oxygen enters the torch through one hose, but here it is divided so that the proper proportion passes through the flame tube and the balance passes through the high-pressure tube. So the torch is first

lighted and regulated the same as the welding torch. This flame is then applied to the line to be cut and, when a spot of the metal gets red-hot, the high pressure oxygen is admitted by squeezing upon the lever valve of the torch handle.

Usually the high-pressure oxygen enters the flame through the center in order that the cutting may be moved along in any direction. The preheating flame is in reality a circular row of tiny flames around the central oxygen outlet. The greater the flow of oxygen, the faster will be the cutting action. The operator is cautioned to be sure that the oxygen valve is accurate before starting to sever heavy metal. In any event, it is not necessary to change the heating flame, since it is only necessary to keep a very small area red-hot in order to make the oxidization continuous.

Continuity is one of the chief essentials of good cutting. Any interruption, unless it is skillfully handled, will produce a ragged spot in the cut.

Since the cutting of thick metal is achieved under pressure which is comparatively high, the welder is cautioned to be sure that everything is all right before turning on the oxygen. Be sure that the hose is one which will resist the pressure. An old worn hose, or a thin weak one, should not be used. In fact it is no doubt better to have a special hose for use in cutting only. The connection at the tank should be safe, too. Any leakage is liable to cause a bad fire for, although oxygen will not burn, it is the great promoter of combustion. Without oxygen nothing will burn.

Cases are known where the nozzle became obstructed and the oxygen returned through the other tube, carrying the flame with it and burning the inner lining out of the hose, thus ruining the interior of the regulator. This probably forms the chief reason for immediately cleaning the nozzle as soon as it becomes sufficiently obstructed to cause the flame to flutter.

It is not intended in this chapter to discuss the details of manipulating the various torches described except in a general way, so let us pass to another torch which should be in the possession of every repair welder, taking up the installation and operation of the various instruments later.

This is what is known as a brazing or soldering torch, of which there are several styles on the market. A common type of the torch is shown quite clearly in one of the illustrations. Here, also, is indicated one of the uses to which the instrument may be put—that of brazing a leaky seam in a copper wash boiler.

Like the carbon-burning torch, the brazing tool uses only one flame element supplied by one hose but, unlike the former, it uses acetylene only instead of oxygen. The main idea in its usage is to prevent oxidization, instead of promoting it as in the case of the carbon torch or cutting torch.

However, while this torch does not use

tank oxygen, it requires that element to produce a flame. It is supplied by the air of the atmosphere entering the side of the nozzle near the acetylene outlet and is adjustable according to the desired intensity of the brazing flame.

On sheet metal—such as copper, thin iron, or steel—this torch is probably cheaper in the long run because it does not use tanked oxygen, and because there is less danger of ruining the work in the event that the operator is a novice in handling the welding flame. However, the welding torch can be employed for all sorts of brazing work if it is properly adjusted and skillfully handled.

This brazing torch, like other styles, is simple in construction; more so than any of the other torches that the welder uses, with the possible exception of the carbon-burning torch. In spite of its simplicity, it is capable of a fine flame adjustment and should be well cared for and not carelessly tossed around anywhere. Its best usage is in connection with a welding acetylene regulator and hose, but the welder may have a special outfit, which has the advantage of saving time in changing connections.

The light weight of the flame makes this torch ideal for soldering, lead burning, or melting babbitt, as the operator can always find a job to keep it busy. It can be bought in either straight or angle-nozzle types to suit the class of work to which he caters. However, it is in no sense a welding torch.

We have now covered the list of torches



"Brazing Torch Burns Acetylene Only."

with which the oxy-acetylene welder should be equipped. The discussion has not dealt with either instrument in the light of furnishing detailed instruction in the adjustment or manipulation of any instrument. It has been the intent to familiarize the workman with the nature and use of his tools—to show him how to take care of rather than how to operate them.

Lack of space forbids more than an abstract of the work, but we will take up each tool later and attempt to give concise instructions for the handling of each. In fact, it is the intention of this department to cover all branches of the torch operator's craft in succeeding issues of the *AMERICAN GARAGE & AUTO DEALER*. If the reader will preserve each issue of this magazine, he will in the end have a non-technical treatise, complete in all branches of automotive welding.

WHERE ARE THE FAULTS IN MY BUSINESS?

(Concluded from page 21)

With a glance you ought to be able to see whether your expenses are running too high; whether Jack, Jim, or Tom is earning the money you are paying him; whether you are buying too heavily, whether this department or that department is paying, whether you should cut down on the credit of this customer or that customer; how much money you owe; how much money you have on hand; how much money is due you; how much money you have invested in equipment and how much of the stock ordered was not delivered; what your investment in capital is, and what would be a fair return on this capital.

There are now over 7,000,000 automobiles in the United States and, with the year 1922, the estimation of sales of automobiles by the various manufacturers is over 2,000,000 which would practically bring the amount of automobiles to be in use in the year 1922 to over 9,000,000 in the United States.

There are, approximately, a little over 100,000 automobile garages in the United States. What, in comparison, is it in your territory? Will you be able to conduct your business with the amount of repair-work, sales, tire work, etc., on a profitable basis without records during the year 1922? If not—get 'em.

North Dakota's Safety First Campaign to Continue Indefinitely.

The "Safety First" campaign, which was formally launched in North Dakota in November will be continued for an indefinite period. The manner in which the press, the pulpit, and the general public have responded to the call of the Board of Railroad Commissioners for general observation of "Safety First" week has been very gratifying.

This is just the beginning of an extensive campaign which the commission hopes to conduct through the year of 1922 for the purpose of educating the public to the dangers of railroad grade-crossings.

"We believe," says the commission in a recent announcement "that the old adage 'an ounce of prevention is worth a pound of cure' is particularly applicable to this situation."

During this year, the commission hopes to eliminate many dangerous rail cross-

ings. It is its purpose to co-operate with various organizations in placing warning signs on public highways and, where necessity demands, it will insist that signals be placed at crossings by the railroads.

That the subject of crossing accidents is considered one of vital importance is shown by the large number of letters which the commission receives from civic bodies and individuals. One letter is in part as follows:

"Your efforts relative to the curbing of railroad and automobile accidents in our state have found response in my heart and mind. I am glad you have sounded the alarm and through the press and pulpit have endeavored to mold public sentiment in favor of cautious automobile driving. I trust that attention to a most serious situation—the maiming and destruction of human life caused by reckless driving—may be sounded and heeded as never before, to the end that an increasingly better situation in this regard may prevail."

The commission has arranged to place placards in every railroad station in North Dakota and in most of the garages, warning the public to be careful when they approach grade crossings. The North Dakota commission is to be congratulated on its efforts to reduce crossing accidents.

Annual Automobile Show at Erie, Pa., Begins January 30.

The Automotive Association, of Erie, Pa., has about completed the final arrangements for the 11th annual Erie Automobile Show, during the week commencing January 30.

The 1922 show will be housed in the mammoth new quarters of the Roth-Cadillac company, now nearing completion and located right in the center of the business district of the city.

With almost four acres of space available last year, the show was extended to include everything automotive and the exhibits included motorcycles, passenger cars, trucks, farm tractors, an extensive exhibit by the Curtis Aeroplane Co., and even two big gasoline-operated locomotives. This year the show will be confined to the exhibit of automobiles and accessories.

Realizing the value of the show from an advertising and sales standpoint, the Erie dealers conduct their show on a thorough business basis. An experienced show manager has been engaged to arrange the details, and offices have been opened in the downtown district for the transaction of the business of the show. Other civic bodies lend their assistance, and an exhaustive publicity campaign attracts the public to the show from the territory for miles around Erie.

Planned on a much more pretentious scale than heretofore, thousands of dollars are being expended to make this year's show a huge success, and a record attendance is looked for.

WHAT IS PRACTICAL HEAD-LIGHT SERVICE?

(Concluded from page 33)

For instance, the device used on Ford cars—the green painted upper portion of the glass—requires the No. 2 focus and nothing else will do. If this device is used with the No. 4 focus, the only result will be to cut off the light on the road and leave the glare where it was—up in the air.

If the bulb was set at the No. 4 focus you would have to have the green paint on the lower half of the glass in order to cut off the glare. If it is used with the No. 1 or No. 2 focus it simply spoils the light without stopping the glare.

Even with the No. 2 focus, for which it is designed, it gives only a narrow streak of light in the middle of the road. It is a good example of legality without efficiency—a one-purpose device that stops glare at the expense of the driving light.

HOW TO MAKE THE DRILL PRESS PAY.

(Concluded from page 23)

ter is found to be thicker, which causes the drill to work hard. Drills are made with the center thicker toward the shank, to strengthen the drill. To overcome this, the center should be thinned, care being taken to remove an equal amount of stock on each side, so that the point will be kept central.

Drilling brass and babbitt requires the changing of the drill-lip clearance angle. Often an operator finds difficulty in drilling these metals. The angle of keenness causes the drill to dig into the work. This crowds the drill to the point of jerking the work from the platen, or throws the belt.

To remove this condition, eliminate the angle of keenness on the drill lips by grinding the lip edge flat on a plane with the axis of the drill, as shown in Fig. 5. Notice that the grinding is being done on the side of the wheel and not on the face. It must be understood that, if the drill after being ground for brass is to be used for steel or iron drilling, it must be reground, as has been explained.

When grinding a drill for brass, a very close inspection should be made after the grinding operation. Notice in Fig. 4 that the cutting edge of the drill looks flat. A flat surface gives the scraping action which eliminates all the trouble when drilling soft metals.

The results of improper grinding are shown in Fig. 7. If a drill has been ground with the point in the center, but the angles of the cutting edge are different, the drill will bind on the side of the hole opposite to that side of the point which is cutting.

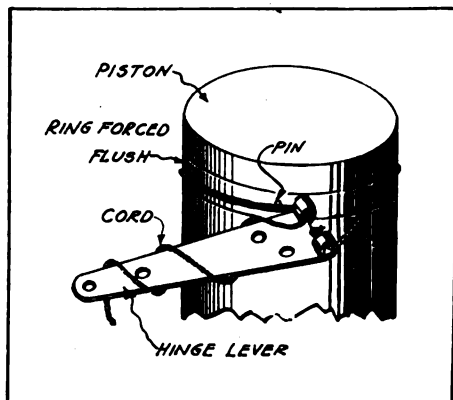
This results in too large a hole and all the cutting is done by the one cutting edge, as shown in Fig. 7-A. If the drill is ground with equal angles, but with the cutting edges of different lengths, the hole will be drilled too large, as shown in Fig. 7-B. (To be concluded)

Installing Pistons and Piston Rings

Installation of Pistons Frequently a Tedious Process—A Method Which Simplifies This Work—Fitting the Piston Ring—A Suggestion for a Piston Ring Filing Board Which Will Be of Much Assistance to the Repairman

By James F. Hobart

When inserting engine pistons it is frequently something of a task to compress the rings so that they can be made to slide into the cylinder. It is sometimes possible

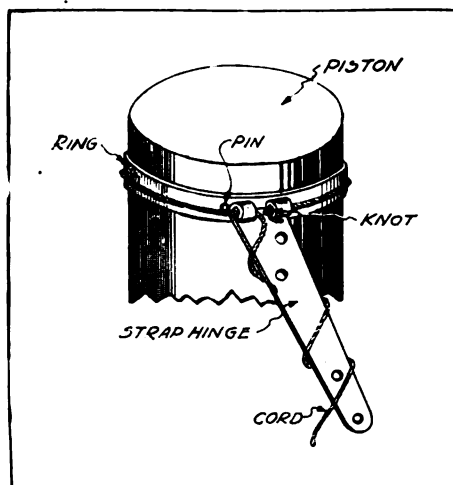


Use 6-Inch Strap Hinge with Two Lugs.

to compress the rings by using the fingers of both hands and exerting all the strength one possesses.

When the piston rings have been squeezed down, the workman is unable to push the piston home because both hands are mighty busy with the ring. Tongs are made to fit each diameter of ring, and any ring may be compressed by winding a small rope around it and twisting the rope with a stick.

But the string method is slow and cum-



Movement of Hinge Causes Rope to Compress Spring.

bersome, and the writer modified it, as shown in one of the illustrations, so as to make it possible for one man to quickly and easily compress a ring with one hand and have the other hand available for pushing the piston into the cylinder. A six-inch

strap hinge was taken apart and that part used which has the two lugs. The outer ends of these lugs were reamed so as to remove the sharp corners, which might otherwise cut the small rope threaded through one of the lugs with a knot tied just inside thereof.

The rope was passed around the ring to be compressed, the end of the hinge lying flat against the ring. Care was taken to place a corner of the hinge at or near the hole in which the pin was placed, thus preventing the ring from turning around on the piston. The cord was drawn tight, wrapped around the hinge, and held securely by the hand which grasped the hinge.

The hinge was then twisted sidewise, using as a fulcrum that lug which had been placed at the pin hole. Movement of the hinge caused the rope to compress the spring until it was flush with the piston and ready to be pushed into the piston. The stress of the hinge tended to rotate the piston and to force it into the cylinder. As the other hand was free to assist, the ring was quickly pressed in far enough to permit removal of the cord or its movement to the next ring.

Fitting Piston Rings.

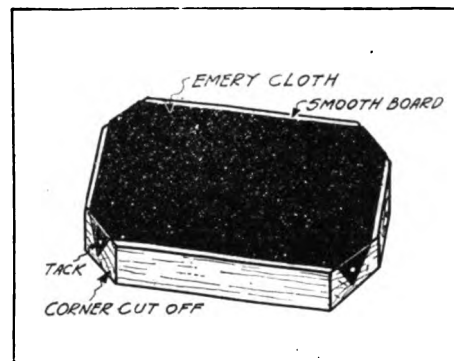
New piston rings are apt to require some side fitting—better look closely at rings which do not—and the usual way is to place a new sheet of emery cloth on a flat board or on an iron surface plate, hold the paper with one hand and with the other move the ring around and around until it has been ground down to the required width.

In doing the grinding, get into the habit of placing the fingers around the ring at the places where the most grinding is required. These points or places may be determined by trying the ring into the groove—which should first be faithfully cleaned until free from dirt or heavy grease. Then roll the ring entirely around the piston in the groove and, at frequent intervals, give the ring a slight sidewise or up-and-down motion which will readily show how much looseness there is—if any—of the ring in various parts of the groove.

Should the ring slip into the groove and show any side play whatever, it may be necessary to reject that ring and procure one a little wider for that particular groove. After a ring has been ground until it fits well in its groove, there will be found to be a slight sidewise play when the ring is tested—outside-in—in its groove.

As stated, beware of the ring which

shows the least bit of looseness before being ground—and look out that it is not too loose after you have ground the ring. Some portion of it may have been ground a little too much. There is great danger of so

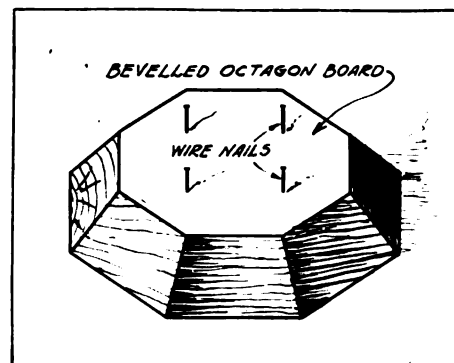


A Good Ring Grinding Board.

doing, particularly by the novice in ring grinding.

It is well for the beginner, when trying the ring into its groove, to mark with chalk on the face of the ring such parts as need grinding. Mark the places needing the most grinding with a plus cross, mark the places which require less grinding with a minus dash and, lastly, mark the portions which need no grinding with a zero mark.

When grinding the ring, place the fingers in such a manner that the greatest pressure from the hand comes directly over the plus marks. In this manner, by careful watching of the grinding and with frequent trials of the ring in its groove, each and every



Handy When Ring-Filing Must Be Done.

ring may be ground down to as good a fit in its groove as is needed.

Too good a fit is not desirable between rings and cylinder. There must be room enough that a film of oil can surround the ring, stopping all gasoline passage but still allowing the ring to move easily and freely

as required by varying diameters in different parts of the cylinder. Beware of the "lumpy" ring which is tight here and fits loosely there. Such a ring will never give satisfaction and, if it cannot be made right by careful grinding, throw that ring away and fit another in its place. This may save much future trouble.

As stated above, the usual way of grinding a piston ring to fit its groove is by rubbing the ring against a piece of emery cloth with one hand and holding the paper still with the other hand. The writer long ago became tired of that drudgery and made up a ring-grinding board. Emery cloth and sandpaper are usually cut letter-paper size, $8\frac{1}{2}$ ins. by 11 ins. A bit of smooth, level board was worked out, $8\frac{3}{4}$ by $11\frac{1}{4}$ ins. and each of the corners cut off to show about one inch of face.

Then a sheet of rather fine emery cloth was laid on the board, an eighth of an inch from the edges all around, and the four corners turned down and each fastened with a small tack. This arrangement proved very handy for fitting piston rings. The left hand was released from holding the emery cloth—something of a job it was, too—and the bit of level board always afforded

a proper surface to do the grinding upon. This ensured better work on the rings, for often the emery cloth would be laid upon a bench, the top of which might be anything except true or smooth. The grinding board also permitted the grinding to be done anywhere, right at the piston, out of the shop or in.

When a good deal of metal needs to be removed from a ring, the emery grinding operation may prove too slow. In this event, the ring may be filed down to nearly the proper width and then finished on the grinding board, which is a fine place to lay a ring when its edges must be filed down a bit. The emery cloth will prevent the ring from moving around under the stress of the file strokes. However, the writer, when he has ring-filing to do, much prefers to use a special board made and kept for that purpose.

Such a board is shown in one of the illustrations and may be made from any bit of board—preferably hard wood—which is three or four inches greater in diameter than the ring to be filed. The best way of making a filing board is to screw the square bit of board to the face plate of a lathe and then turn the board around, and cham-

fer off one edge right down to nothing and back to a quarter of an inch of the diameter of the rings to be filed.

The value of a special filing board lies in the fact that, the edges being chamfered off, the file handle is not forever striking against the board and that the base of the board can be made considerably larger than the ring-diameter. This gives the board more stability under the pressure of the file strokes, which is an important matter when rings three inches or less in diameter are to be filed.

The board shown in the illustration was not turned in a lathe. The writer did not have the use of that tool, therefore the board was marked out in an octagon—eight sides—the eight sides planed near enough alike to look well, and then planed down to a feather edge and back a couple of inches, nearly to the diameter of the ring to be filed.

Several wire nails—with the heads cut off—were driven in at just the distances apart which would cause the nails to hold fast a piston ring which could be slipped either around the nails or inside of them as may seem best.

Repairing the Leaky Carbureter

Unless Carbureter Is Properly Cared for Leaking Is Likely to Become a Firmly Established Habit—This Entails a Great Wastage of Fuel—Two General Classes of Leaky Carbureters—Methods Suggested for Their Repair and Care

By S. E. Gibbs

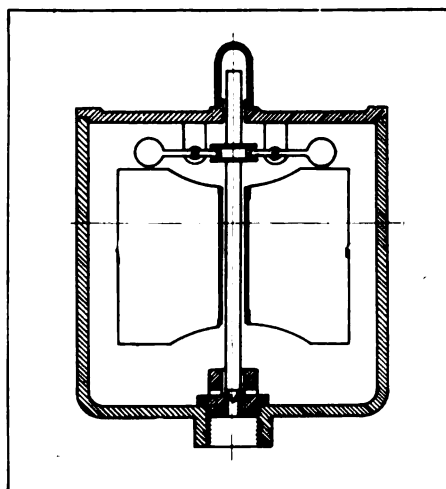
Most carbureters leak more or less and, if not properly cared for at the first signs of trouble, this habit soon becomes firmly established. In fact, it is a rare thing for a carbureter service man to find a properly-adjusted float in a carbureter that has been in service more than a year. Thousands of dollars' worth of fuel is wasted each year by leaking carbureters. Often a user of but one machine will suffer a yearly loss of from \$10 to \$100, yet scarcely realize his carbureter is at fault.

Leaky carbureters may be classified into two general classes. In one case, the leak is caused by loose connections and breaks or cracks in parts or defective gaskets. This class is comparatively easy to detect and repair. In the other case, a defective needle valve or float mechanism fails to shut off the gasoline and allows it to rise to such a level in the bowl that it flows over the jets and causes the carbureter to flood.

The needle valve is operated by the float and should be adjusted so that it seats and shuts off the gasoline when the level in the bowl is about $1/16$ inch below the top of the jets. If the fuel level is raised above this point, the slightest amount of wear on the float apparatus would allow the level to increase slightly and flooding would take

place. This also takes care of any change of level caused by tilting, such as leaving the car standing with the front low level where the bowl is located back of the jets or vice versa when the bowl is located in front of the jets.

Probably the most common cause for flooding is that of dirt lodging under the needle valve. By lifting the needle valve for a second, the gasoline will flow freely and generally washes out any obstruction.



Float Properly Adjusted in Carbureter.

If this does not displace the dirt, the needle valve should be tapped lightly with a small hammer. This will crush any ordinary obstruction and the needle will seat firmly.

Either of these remedies is more or less temporary, as the real cause is dirt in the gasoline tank and a defective strainer. Trouble can be expected until the tank is cleaned and the strainer repaired. If the tank has a large opening in the bottom, it can usually be cleaned by flushing it out several times. Otherwise, it must be removed from the machine, flushed and inverted to empty.

After considerable experimental work, most manufacturers have found that a needle with a 60-degree point is most satisfactory. A sharper point tends to stick in the seat, and a blunter one does not hold as well as a sharper one. A narrow seat is desirable, as it makes possible a high-needle pressure and is less apt to catch dirt than a wider one.

As the needle valve wears, its angle generally changes to a more blunt one and the seat becomes wider. This means that the needle must be brought down farther toward the seat, in order that the fuel level will not be changed. When the wear is but slight, an adjustment of the collar will correct the fuel level.

When the wear becomes excessive and the carbureter persists in leaking, the best remedy is a new needle valve and seat. If these are not to be had—as in the case of a carbureter that is not manufactured at present—the needle valve can be trued up in a lathe, or a fair job can be done by chucking it in a drill and smoothing the seat with a file while it is being rotated at high speed.

In either case, a fine stone should be used for finishing as the slightest scratch will allow the gasoline to seep by. If the seat is out where it can be gotten at, the top can be dressed down until a sharp corner is again suitable for the needle valve to seat against. If the seat is in a hole as it often is on the modern instruments, it can only be dressed with a bottom reamer.

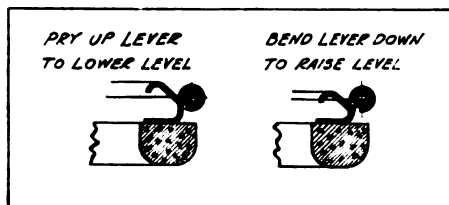
When the new seat and reamer are ready to be put into place, they should be examined carefully and tapped lightly when placed together. If a leak exists, a small amount of fine grinding compound should be placed on the needle and, after a slight amount of grinding, another test should be made.

If the needle valve and seat are in proper condition and the carbureter still floods, the trouble is either in the float or float adjustment. At any time, if the float lies on the bottom of the bowl and is not affected by the fuel, it is defective. If it is up against the float levers and the gasoline level is still too high, the trouble is probably in the adjustment.

Both cork and metal floats are in common use. The cork floats sometimes become soaked with gasoline and, therefore, are too heavy to work properly. A defective cork float can usually be detected by the looks of the varnish with which it is coated to prevent the fuel from soaking into it.

When the varnish begins to peel or blister, trouble is likely to appear soon. As cork floats can be secured at small expense, a new one is the best and cheapest remedy for the trouble. However, if a new one is not to be had, the old one can usually be repaired in a satisfactory manner.

The float which is to be repaired should be removed, all the varnish sandpapered from it, and then dried in a warm oven or in the sun. When it is thoroughly dry, it



Method of Adjustment When Needle Valve Is Not Adjustable.

should be coated with a coat of thin shellac and allowed to dry. Three or four coats should be applied in a similar manner before the float is put back into use.

A metal float can be tested by shaking it near one's ear and listening for the splash

of the fuel which may have gotten into it. If one cannot make sure by this method—as is sometimes the case when a very small leak is present—the float should be submerged in boiling hot water. If there is any gasoline in it, the heat will cause it to evaporate and set up a pressure which will force out small bubbles at the defective places.

When the leak or leaks are located, they should be marked and a hole not over 1/16-inch made in the top near one edge. Then it can be drained and dried in a warm oven or in the sun during the middle of the day. When it is dry, the leaks should be soldered and, lastly, the hole closed by soldering. In all soldering on a float, care should be taken that only a very small amount of solder is used, as the extra weight will affect the action of the float.

When the needle valve, seat and float have been tested the adjustment of the float level should be corrected. If the needle valve protrudes through the cover, as is the case in most carbureters that use a metal float, make a mark on it just above the cover when it is in normal position with the fuel turner on. Then remove the cover and place the mark in the same position in regard to the cover as it was when made and note the position of the float levers.

They should be horizontal and, if not so, the collar should be moved in the desired direction and the test repeated until a correct adjustment is secured. In many carbureters a glass is placed in the side of the bowl so that the fuel level can be seen, making the adjustment an easy job.

If this is not the case, the workman can drill a small hole in the bowl at such a height that the fuel will just begin to run out when the proper level is reached. The hole should be of such a size that a standard-size plug may be fitted into it when the instrument is in use.

When a cork float is used, the needle-valve method of checking can not be used. However, the jets can often be seen and the level checked in that manner. Sometimes there is a cover over the needle valve that can be removed and the fuel level checked directly. If the needle valve is not adjustable, the metal fitting which holds the float can often be bent a slight amount and a suitable adjustment obtained.

At the present cost of fuel, a defective carbureter will soon cost the owner many times the price of a repair job or, in many cases, the price of a new carbureter.

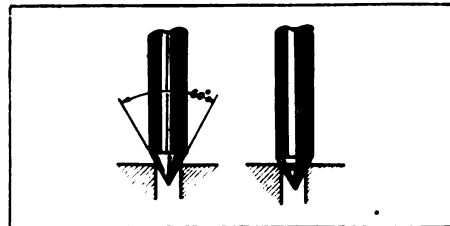
Automobile Association Voices Opposition to Increased Tax.

At the recent meeting of the executive committee of the American Automobile Association, held at Washington, D. C., the association declared a ban upon the touring motorist who seeks road information without membership in an A. A. club, increasing the individual membership fees to \$10, voiced emphatic opposition to any further taxation of automobiles and

went on record for more and better service to motor car owners generally.

President George C. Diehl, who presided over the meeting, made the following statement after adjournment:

"With the ever-growing number of automobiles in use an increasing need has



Manufacturers Have Found Needle With 60-Degree Point Most Satisfactory.

come for such an organization as the American Automobile Association. As a result of the increased demand upon the organization for maps, road information, legislative activities and other services such an organization should render to motorists, it became imperative for the association to at once increase its membership and its membership dues to meet the also multiplying overhead expenses. Therefore, it was decided to make the necessary amendments to the by-laws to obtain more revenue with which to carry on its work.

"Because a widening scope of the organization's activities has been urged upon every hand, it was agreed that more members and more revenue should be forthcoming.

Plans for an intensive membership campaign are being formulated and every effort will be made to solicit every motor car owner in the United States for either membership direct or in one of the A. A. affiliated clubs.

"In addition to its increased legislative activities, it will be of special interest to motorists to know that the work of the A. A. touring bureaus and map-making departments will be materially broadened.

"Having recently and successfully opposed what appeared to be an unsound tariff on oil, the association will for the time concentrate upon the passage of much needed national roads legislation, and upon the defeating of any plan to further tax motor cars."

In reference to the recent suggestion that an additional Federal tax of \$10 be imposed upon motor car owners, irrespective of size or power or price, a resolution opposing any legislation imposing an additional burden on car owners was adopted by the committee.

Britain's Motor Cars.

The number of motor vehicles of all kinds registered in Great Britain from January 1 to August 31, 1921, was 870,782, and the gross amount of taxes collected was £9,876,105, which is distributed as follows: England and Wales, £8,777,863; Scotland, £888,227; Ireland, £210,015.

What Is Practical Headlight Service?

Proper Position of Bulb of Utmost Importance—How the Commonly-Used Positions Are Secured—Some Experiments Which Will Show the Various Effects of the Different Positions of Headlight Bulbs on the Driving Light

By Robert Livingstone

In the December issue we explained how, if a large number of small flat mirrors were placed around a headlight bulb at such angles that all would throw their reflections of the filament parallel to each other—that is, in the same direction—all of these mirrors would group themselves into a special kind of a curve called a parabola.

We learned that the position of the bulb then corresponded to the "focal point" of the parabola, a point which bears the same sort of relation to the parabolic curve as the center of a circle does to a circular curve.

It is very important to know what happens to the beam of light from a parabolic reflector when the bulb is placed at other positions than the focal point. While for certain purposes—as when installing some makes of dimming lenses—the bulb is set at the focal point, there are other occasions when it is necessary to use other positions in order to get the best driving light.

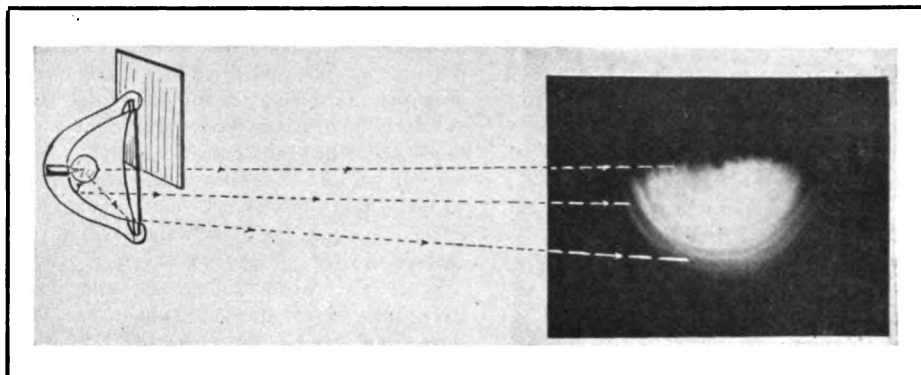


Fig. 4—Bulb Behind Focal Point and Top Half of Headlight Covered Cuts Off Top Half of Light on the Wall.

glare, the bulb must be placed behind the focal point or the glare will not be stopped.

All automobile headlights have some sort of device for moving the bulb back and forth along the axis of the reflector. This is required because scarcely two bulbs, even

the focal point or almost anywhere except where the old filament was.

Again, in some poorly-made headlights the sockets are loosely fastened, or the bulb fits so loosely in the socket that the filament easily gets away from any point where it may be placed. Consequently, the light on the road goes wrong.

Regardless of whether the filament is to be placed at the focal point, or behind or ahead of it, it is absolutely important that the filament be in the center or axis of the reflector—not off to one side. If the filament is correctly in the axis, the spot of light thrown on a wall will be perfectly round and uniformly bright.

If it is off to one side, the spot of light will be egg-shaped and there is likely to be an especially bright spot a little to one side of the center. One can see the effect by putting the tip of a finger on the point of the bulb and wiggling it around.

Sometimes a slight imperfection can be fixed by filing the contact on the base of the

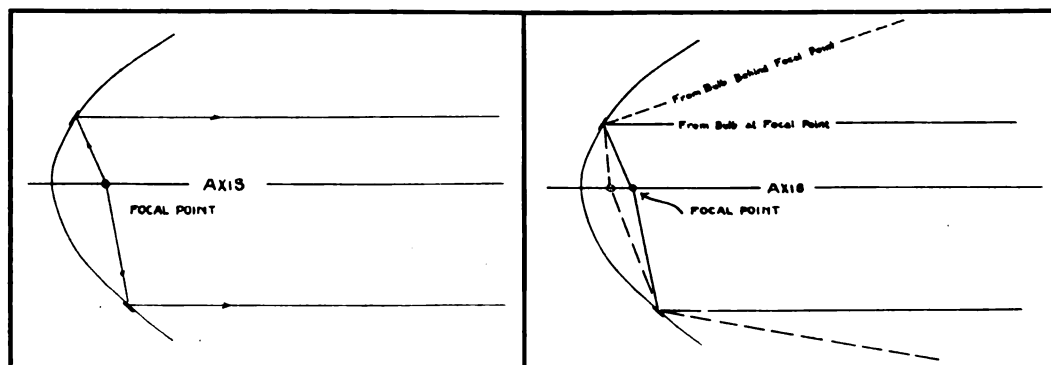


Fig. 1—Placing Bulb at Focal Point Makes Rays Parallel as They Come From Reflector. Fig. 2—Placing Bulb Behind Focal Point Causes Rays to Spread as They Come From Reflector.

For instance, some makes of lenses are designed to operate with the bulb ahead of or behind the focal point. Also, if the upper half of the headlight glass is painted as a temporary makeshift for stopping

of the same make, will be alike. One may have a long filament and another a short one, so that if a perfectly-positioned bulb is replaced by a new one, the new filament might happen to be behind or in front of

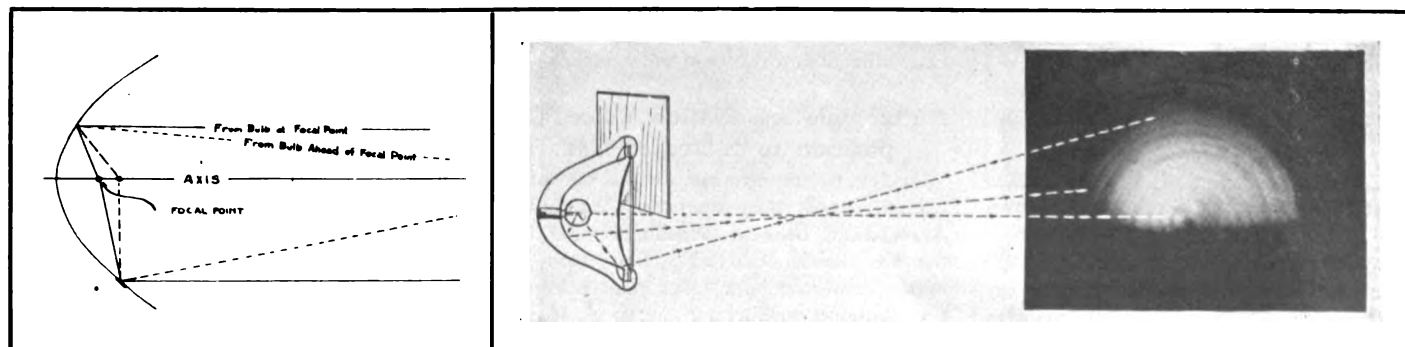


Fig. 3—Placing Bulb Ahead of Focal Point Causes Rays to Concentrate and Cross at Points Somewhere Ahead of Reflector. Fig. 5—Bulb Ahead of Focal Point and Top Half of Headlight Covered Cuts Off Bottom Half of Light on the Wall.

bulb a very little, to flatten it and make the springs in the sockets press squarely upon it. More often you will have to drive little wooden wedges into the socket beside the base of the bulb to hold it in

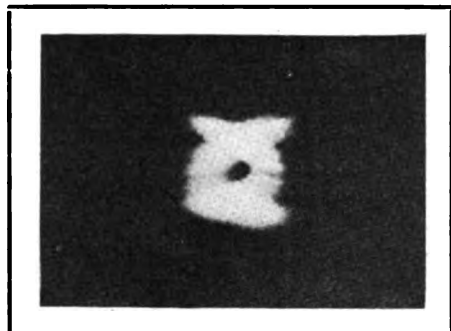


Fig. 7—No. 1 Focal Position.

the center. At any rate, this centering is the first and most important adjustment to make in these days of carelessly-made bulbs.

Possibly, the simplest way to understand how the light beam is changed by moving the bulb back and forth along the axis, is to imagine a billiard table shaped like a parabola, Fig. 1, with the "spot" at the focal point. If the ball is placed on the spot and shot at any point of the parabolic curve it will always rebound in a direction parallel to the axis, just the same as each light ray comes out of the headlight parallel to the axis if the bulb is at the focal point.

Now imagine the ball placed behind the spot, or focal point, and you can easily see that a shot at the cushion will always rebound at an angle that diverges from the axis, Fig. 2, in a greater or less degree, depending upon how far back of the spot the shot is made.

To carry the comparison back to the automobile headlight, point the headlight at a wall and set the bulb at the focal point—which you can determine because that is the position that gives the smallest possible spot of light on the wall, showing that the rays are coming out practically parallel to each other. Then move the bulb back into

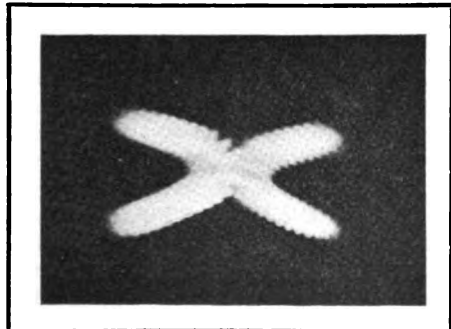


Fig. 8—No. 2 Focal Position.

the reflector, and the circle of light will increase in size.

You can prove that the rays really diverge or spread out away from the axis by covering the upper half of the headlight, Fig. 3, and noting that this cuts off the upper half of the light on the wall.

Now back to the billiard table again. This time, place the ball ahead of the spot and you will find that no matter at what part of the curve you shoot, the ball will rebound in a line that angles toward the axis, Fig. 4, and that from all points on the cushion it will bound off on lines that cross at one point on the axis and then diverge again. The farther ahead of the spot the ball is placed, the closer will the crossing point be to the open side of the parabolic curve.

You can see how this proves out on the headlight because, as you move the bulb ahead of the focal point, the circle of light on the wall increases in size and, if you cover the top half of the headlight, the bottom half of the light on the wall is cut off, Fig. 5.

Another way to show this effect with the headlight, which is perhaps clearer, is to cut a disk of cardboard as large as the headlight glass and make two $\frac{1}{4}$ -inch holes in it about three inches apart, as shown in Fig. 6. Put this over the front of the headlight and on the wall—instead of the round dots of light you might expect—you

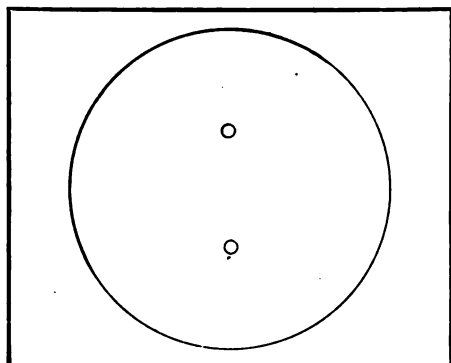


Fig. 6—Cardboard Disk as Large as Headlight Glass With $\frac{1}{4}$ -Inch Holes About Three Inches Apart.

will see two distinct pictures or images of the white-hot filament.

This is another proof, incidentally, that the entire beam of light from the headlight is made up of innumerable images of the filament for, no matter where in the cardboard the holes are located, they will throw images of the filament on the wall.

When the bulb is at the focal point these images will pile on top of each other, Fig. 7. This is known as the No. 1 focus, and is the position of bulb used when you want a long, narrow beam of light, with plain glass in the headlight. It is also used with some anti-glare lenses, but the highest efficiency in road illumination can not be secured, with or without a lens, if this position of the bulb is used.

When the bulb is behind the focal point the images will separate and the points will be toward each other, Fig. 8. When the bulb is set so that the points of the images just miss touching it is said to be at the No. 2 focus. All of the rays of light diverge as they leave the headlight. If plain glass is used in the headlight, this focus gives the best all-around light for driving—that is, it lights up the road for a reason-

able distance and for a reasonable width.

Likewise, this position of the bulb is especially adapted for the design of lenses for more efficient distribution of the light on the road than plain glass can give, and

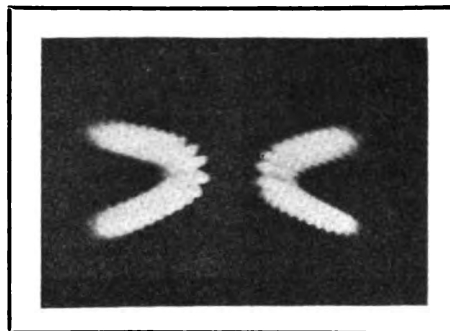


Fig. 9—No. 3 Focal Position.

the best lenses are designed to use the No. 2 focus.

Moving the bulb slightly forward, so that the tips of the images just touch, gives the No. 3 focus, Fig. 9, which may also be used with plain glass in the headlights and which is used with some lenses. In this position, the point of the filament is at the focal point of the reflector and the rest of the filament is behind it.

As you continue to move the bulb forward in the reflector, you will note that the images of the filament thrown on the wall approach each other, pile up, and finally separate again, but now with the points of the images away from each other.

The position shown in the illustration, Fig. 10, is the No. 4 focus. Like the No. 2 focus, this position of the bulb in the headlight would give a spreading beam of light, but the beam of light would not begin to spread until after the rays had crossed over.

This may be proved by taking a large sheet of paper, holding it against the wall so that it catches the filament images and then carrying it toward the headlight. Watch the action of the images as they get closer together, pile on top of each other at the cross-over point and then separate.

All of these experiments may be varied

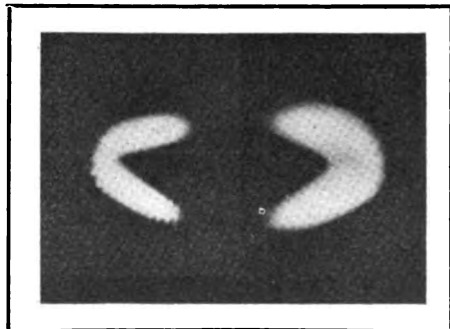


Fig. 10—No. 4 Focal Position.

by using half a dozen holes scattered over the surface of the cardboard disk, and a study of the light in this way will be valuable to any service man.

The four focal positions are important for the headlight expert to know about, be-

(Concluded on page 28)

Glimpses in the Garageman's World

Novel Method of Display Used by California Dealer—Map on Side of Garage
Convenient Way of Answering Tourist Questions—"Surprise Them Occasionally with Something Out of Ordinary" Says Missouri Service Man

Road Map for Side of Garage.

The O'Neill Oil Co., of Decorah, Iowa, has hit upon a novel and practical bit of service to tourist customers which might well be copied by garagemen in many small towns where several roads lead in and out.

Decorah is the county-seat of Winneshiek County, Iowa, and, as is usually the case with county-seats, many roads radiate from it. The more roads there are leading into any town, the better folks in the surrounding country seem to like it. Not so the tourist. He is looking for one main road to somewhere, and does not care to waste time and temper picking it out of a complexity of little ones.

When the tourist stops for gasoline or oil, he has a leisure moment. Nine times out of ten, as he stands around the car while the garageman is filling up the tank, he asks how to get to the next town which he wants to make. Most tourists know all the main towns they are to pass through. In asking the garageman about the road, he wants just some simple directions. For instance, if it is in Iowa—where the primary roads are marked by numbers—he wants to know what number to follow.

The O'Neill Oil Co. has forestalled its tourist customer questioners by painting a large map on the west side of their station. The map shows Winneshiek county and adjacent parts of other counties—enough of them so that the next important town in every direction is shown on the map. Then all roads leading to these towns are drawn on the map, and, if primary roads, their numbers printed on them. Minor towns and villages are also shown.

The tourist customer now—instead of asking for road information from the O'Neills—stands, hands in pockets, in front of the map, and learns more by seeing than he could from the clearest directions given by word of mouth. Meantime, the O'Neills are providing oil without the bother or delay caused by asking many questions.

A String of Accidents.

T. B. Cauley, hardware merchant and dealer in automotive supplies, of Rusk, Calif., by the use of the rather common "cobweb" effect, devised a striking window

display of automotive parts and accessories.

He began by collecting, in the course of a month or so, a score or more of newspaper accounts of automobile accidents due to a variety of causes. These, cut out and neatly trimmed with the headlines, were pasted upon a large piece of cardboard and

devices, when an accident is considered in all its aspects, often have something to do with it, and sometimes their defectiveness is directly responsible.

There was also in Cauley's display one or two accounts not exactly of the nature of accidents. One autoist was hung up for hours on a lonely desert road when a simple tool that he might have had in his kit would have enabled him to make a quick repair.

The string to the account pointed this out. A very good brand of automotive paint was similarly advertised by being connected with an account of an owner who had sold a year-old car at a sacrifice when, if he had kept up its outward appearance, he would have added to its sale value.

Card Advertising Brings Results.

The Ocean Garage, of Asbury Park, N. J., uses a very simple but effective means of advertising. Cards measuring 2½ ins. by 3¾ ins.—with the name and address of the garage on the front and a table of distances from Asbury

Park to the main towns and cities within 87 miles, on the back—are given to a number of hotels and boarding houses in Asbury Park.

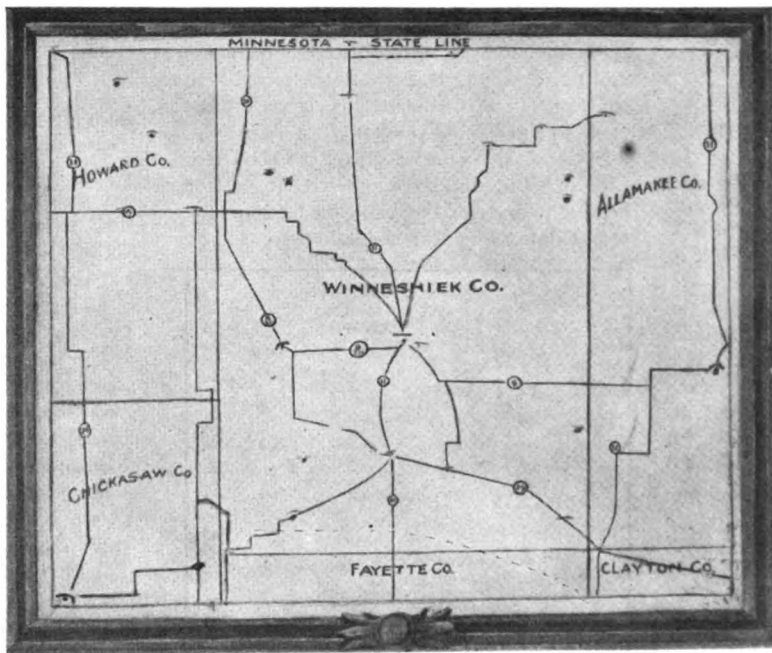
The hotels place these cards on their office counter where their guests may secure them. The card is generally taken and kept for future reference and, nine times out of ten, the man who has a card will store his car at the Ocean Garage every time he comes to Asbury Park.

The hotels are glad to place these cards on their counters as it is an accommodation to their guests.

Again It's "Service First!"

"Be careful and painstaking in looking after the wants of the public. Surprise them occasionally with something out of the ordinary to indicate that you want and appreciate the business. Handle only such goods as will stand up under the most rigid tests and have the best workmen you can get."

Such, in part, is the policy of the Berry-Patmor Automobile Service Co., Caruthersville, Mo., which, after two years of keen competition with well-established competition, is ready to put up its own



Makes Tourist Customer Happy and Saves Time.

then placed conspicuously in the center of the background of the window, in which was arranged a large assortment of automotive parts, accessories and tools.

To each account of an accident was pinned a long, narrow brightly-colored tape or ribbon that was then stretched and tied to the particular article, the absence or poor condition of which was more or less responsible for the accident. The bright lines, radiating from a central point and extending to all parts of the window, easily attracted attention.

On the cardboard above the collection of accidents was written in large letters:

"One of These Accidents May Come to You and Your Car. Follow the String and Buy the Part That Leads to Safety."

By selecting the accounts with care and keenly analyzing each accident, Cauley was able to make such a display cover a great variety of parts and supplies. Brakes, lights and non-skidding tires were by no means the only things that were thus forcibly brought to the attention of car owners.

Oil, horns, bearings, a windshield which is not clean, and many other articles and

building and broaden out to an even greater extent in furnishing service to automobile and truck owners of Caruthersville and adjacent territory.

"We didn't reach our present position in the automotive world of Caruthersville over night, or without hard work," said J. T. Patmor, a member of the firm, "but we did attain it through a lot of hard work and strict attention to business. A lot of people say there are certain secrets in business and that there is a lot of luck attached to the game of making a success of any undertaking. That might be true—we won't argue that point—but as far as this company is concerned, they didn't figure in our business during the past two years."

He then referred to the service that his company recently gave when a large caravan of automobilists made up a "good roads" party that traveled from Caruthersville to Kennett and back. About 200 cars comprised the delegation. The Berry-Patmor company knew there would be a lot of trouble with tires and engines on the trip, so they anticipated the needs of the motorists by sending their service truck along.

That the guess was a good one is proven by the fact that a repair was made before the automobilists had gotten two blocks away from the starting point. At regular intervals on the way to Kennett and back again, the truck was called upon to come to the rescue of automobile drivers, replacing casings and tubes and helping out on engine troubles.

When the truck got back home, it had made \$121.70 for the company. Appreciative customers, both from Kennett and Caruthersville—who had been helped on the way and thereby had been enabled to make the entire trip—stopped at the Berry-Patmor store and bought supplies, so that the receipts for the company as a result of its thoughtfulness aggregated about \$300.

"Our service was most favorably commented upon," said Patmor. "In that crowd were many automobilists who had never been to our store. They came in and expressed their appreciation and said they expected to trade with us in the future. It made a lot of new friends for us, and quite naturally they will tell their friends so that the effect of that service will radiate many miles from here and among scores of automobile owners."

The truck that made the trip was a Ford. It is painted a bright red and has gold lettering advertising the Horse Shoe casings and tubes. The truck is well-known in Caruthersville and surrounding territory because of the service it gives, and persons seeing it on the streets unconsciously connect it with "real service."

The truck is equipped with compressed air and a complete set of repair tools. The company sends the truck out to make repairs anywhere in the city or within a mile radius of the store to give free road service. Repairs are made at the same charge

made when work is brought to the store. Casings are delivered three miles without extra charge and, upon several occasions, they were delivered six and seven miles.

The firm believes implicitly in advertising and, besides using space liberally in its home papers, it follows a plan of sending circular letters to 3,000 car owners of Caruthersville and adjacent territory for many miles. Late models of Edison-Dick mimeograph and addressographs are used. The windows of the company are dressed each week and handsome electrical displays are arranged to attract the attention of the passersby.

As a result of this advertising, the firm can show that when it began selling the Horse Shoe tires and tubes they were practically unknown in this district, but now the sales on them run to about \$15,000 a year while \$4,000 worth of other makes of tires are also sold.

The Berry-Patmor people handle the Exide batteries, and the same service for the roadside motorists that is given with tires and tubes is given for batteries. The Delco light plants are handled by the firm, and the building now occupied by the company is lighted with one of these plants.

An expert in the matter of handling tires and batteries is employed, and he is sent away once each year to some large city plant to absorb new ideas and ways for making repairs along those lines.

The company also prides itself on its negro helper, who they proclaim is the champion tire changer in the state of Missouri or elsewhere, and they declare that he is willing at any time to defend his claims to the honor by taking on any other tire changer questioning them in a contest.

Gift for Customers.

A little key ring with a tab which bears his advertisement and a number on one side and a message on the other side, was accepted with appreciation by the customers of one garageman. The message was this:

If found, bring this bunch of keys to the Sterling Garage and they will be delivered promptly to the owner whose register number appears on the other side.

In a book in the garage, the numbers and the names of the owners were noted as the novelty was given out. It connected a number of men with lost keys and was valued by those more fortunate.

Ad Cheers Troubled Automobilists.

Nailed to trees and fences at intervals along the automobile roads in the mountains of Mariposa and Merced counties, California, the motorist will see a red wooden arrow. On it are the cryptic words—"Hoborn's Grease Spot, Modesto, Cal." A round white dot is on the arrow—the words surrounding it.

The initiated, who are out of gasoline or having engine trouble, are making for that spot. The others will reach it eventually anyway, for it is a gasoline and oil station situated just where the mountain road terminates in the city of Modesto.

Over his lubricating station is a huge red sign with the same slogan, "Hoborn's Grease Spot." Here motorists can get lubricants of all kinds—oil, gas, water, and help in time of trouble which they appreciate.



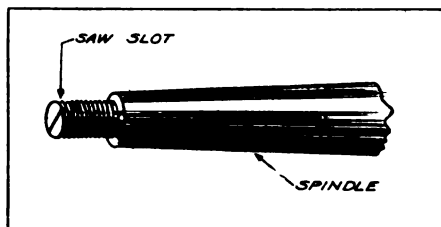
Negro Helper of Berry-Patmor Co., Caruthersville, Mo., a Champion Tire Changer.

Practical Hints for Shop Mechanics

Helps in Aligning Cotter Holes.

Often, when replacing a nut, the castellations are filled with old grease or dirt and, when the nut is nearly tight, one cannot see the cotterpin hole in the bolt.

This is especially true on spindles and



Useful When Replacing a Nut.

axle shafts. So we take a hacksaw and saw a line across the end of the spindle or shaft, parallel with the cotter hole. This is a great help. The illustration makes this clear.—R. W. T., Mo.

* * *

Soldering Around Sediment Bulb.

Often, in soldering around the sediment bulb of a gasoline tank, it is desirable to use an open flame rather than the soldering iron.

This is a dangerous proposition if there happens to be any gas formed inside the tank. The operation is made safer by unscrewing the sediment bulb and screwing in a long pipe nipple. This pipe conducts the gasoline to a safe distance from the flame, besides forming a handle with which to hold the threaded collar.—A. M. R., Ohio.

* * *

Removing Brass Bushings.

Often the removal of worn brass bushings is no easy task, and frequently one has to go to the trouble of splitting the bushing with a hacksaw or chisel to facilitate the removal. This is particularly true of the spindle-body bushings on a popular make of automobile.

A very simple and easy way of removing brass bushings is to secure a tap that will cut a thread in the bushing. Thread it some distance into the work, and then drive it out from the other side. The bushing will come with it.

It is a good plan to keep an old tap for this purpose. It will save much time and labor.—G. F. S., Ill.

* * *

To Find Firing Order of Engine.

Many of the present-day cars come with the firing order stamped on the engine block. The shop man will occasionally run across a car of which he does not know the firing order. Instead of taking off the cylinder head to observe the valve and

piston movement, try this method of determining the firing order of the cylinders:

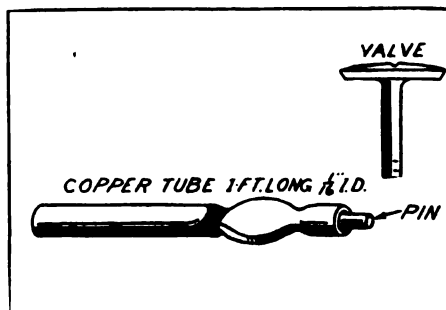
Open the petcocks of all cylinders and put a wad of paper in each. If the engine is turned over very slowly, it will be possible to observe the order in which the wads blow out. This will be the correct firing order for the engine. The method works as well on sleeve-valve type motors as on the poppet type.—L. B. R., Mich.

* * *

Replacing Round Keys in Valves.

In replacing round keys or pins in valves, they are sometimes hard to get back into place, especially on Fords.

We find that, by taking a small-sized copper tubing and mashing it together $\frac{1}{4}$ -inch from one end—the tube should be about one foot in length—and inserting the key in the tube, it can be easily guided into



Reaches Out-Of-Way Places.

places where fingers or other tools will not go.

By inserting the pin in the valve-stem hole, it can be given a slight purchase and the tubing will withdraw leaving the pin in its place.—S. Bros., Ill.

* * *

Testing Carburetor Floats.

The floats used in carburetors and vacuum-feed systems often develop leaks that are so small that they are consequently hard to find. If the float is submerged in hot water, the air and gas in the float will expand and be forced out at the hole, rising in bubbles to the surface of the water. By tracing the bubbles to their source it is an easy matter to locate and stop the leak.—L. R. B., Iowa.

* * *

Cylinder-Head Gasket Retainers.

More or less difficulty is usually encountered in keeping the cylinder-head gasket in place while the cylinder head is being put into place. The gasket is often injured by the cylinder-head bolts because it has slipped to one side and thus prevents the bolt from passing through it at the proper place.

Cut the bolt heads off and make two

extra cylinder-head bolts or similar studs by threading a piece of rod the same size as the bolts. Saw a slot in the upper end so they can be removed by means of a screwdriver and they will hold the gasket in place and act as a guide for the head, if one is screwed into a bolt-hole at each end of the cylinder block. When the head is in place and a few of the bolts started, the studs may be removed.

This method of replacing the cylinder head is a time-saver and, by assuring absolutely correct placement of the gaskets, makes a good job certain.—E. S., Minn.

* * *

Handy Pick-Up Magnet.

Bolts, nuts and many other small iron parts are often dropped into the engine pan, a cylinder, or other places where they are hard to get at with ordinary tools.

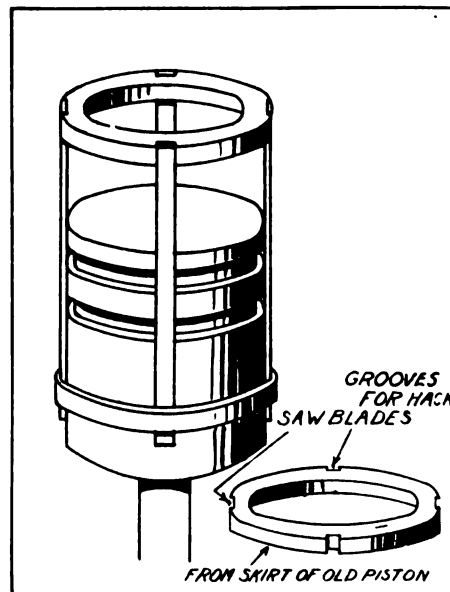
A long, slender magnet will prove very useful in such cases. Such a magnet can be made by winding a coil, such as is used in the ringing mechanism of a telephone or a door bell, which will serve when the rod has been inserted as a core.

Three or four dry cells should be used for an ordinary sized magnet.—S. E. G., Iowa.

* * *

Piston Ring Guide.

A very handy device for guiding piston rings down over the top grooves of a piston can be made, as shown in the illustration, by cutting off about an inch of the skirt of



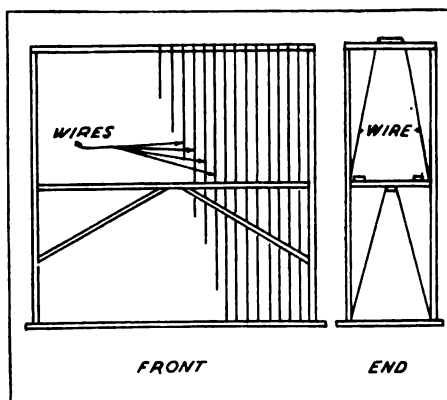
Aids in Guiding Rings Over Top Grooves.

an old piston, filing four grooves in it, and securing in the grooves some pieces of hacksaw blades as shown.

The use of the tool is illustrated.—C. W. W., Wash.

A Double-Decked Tire Rack.

Any frame tire rack may be built for this outfit, as the main point is the wire that separates the tires and keeps them in an upright position at all times. Wire



Any Frame Tire Rack May Be Used.

strung up and down, about four inches apart, keeps the tire in perfect position.

Then, when a tire is taken from the center, the tires will not fall together and be out of the proper position. This frame rack that I built with the wire tire separator is better than many high-priced tire racks that you buy.—B. S., Iowa.

* * *

Primer and Auxiliary Air Valve.

A convenient means of priming the engine may be made by tapping the upper side of the intake manifold and extending a tube from the manifold to the dash.

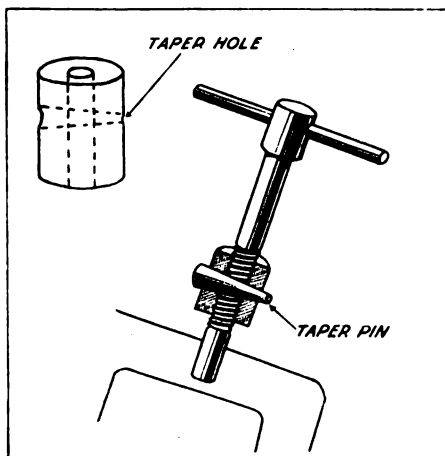
The dash end of the tube is fitted with a priming cup, which serves for priming or for use as an auxiliary air valve to save gasoline.—R. D., Mass.

* * *

Stud Wrench.

There are many kinds of stud drivers, yet I find the type which I designed suits me best. It is easy to make and use.

The tool consists of a coupling—the



Simple and Easy to Make and Use.

threads and size the same as the stud that is to be driven—a handle, and a taper pin. The sketch shows the tool and its construction.

It is used by screwing the tool on to the

stud until it is tight on the taper pin. Then the pin is driven tight, binding the two.

The stud is driven or removed, as desired, and when the operation is complete the taper pin is released by a blow on the small end.—C. H., Wash.

* * *

Tire Patch Holder.

Tire patches which are to be vulcanized into the inside of the casings are rather awkward to hold while the cement is drying. In many instances, they are so held that the cemented surface comes in contact with something and part of the cement is removed when they are picked up again.

One tire repairman has devised a patch holder that is giving very satisfactory service. Pieces of $\frac{1}{2}$ -inch boards, about two inches longer and wider than the patches that are to be dried, are obtained and fitted with a hook so that they can be hanged from a wire.

At each corner of the board is fastened a rubber band which has a fishhook, from which the barb has been removed, fitted to one end of it. When the patch is cemented and ready to be dried, it is placed, dry side down, on the block and a hook fastened to each corner. Then the board is hung up out of the way. In this way, the patch is held straight and allowed to dry without being touched.—G. E. S., Iowa.

* * *

Helps When Grinding in Pistons.

I am sending you a hint which I believe will be helpful to a lot of garages.

Grinding or lapping in pistons is no fun when you do it by hand and one is not able to use a piston which is large enough to take the oval shape out of the cylinder.

Take two Ford connecting-rods, weld the large ends together, cut one of the small ends off and find a universal joint out of a set of socket wrenches. Weld on.

Now you are ready to grind in the piston. Put the piston and the pin on, using the old pin. Put the universal-joint end into a power-driven drill press. Set your engine block vertically under the press, and, as the machine runs, pull the lever up and down so as to cut corkscrew-like in the cylinder. Use a fast-cutting carborundum compound and water—no oil.

It will take but 20 minutes to grind in a large-size piston and of large oversize. This would take one day by hand, and you would not be able to grind in another one the next day. This device can easily be filed a very little and will fit all pistons.—C. A. M., North Dakota.

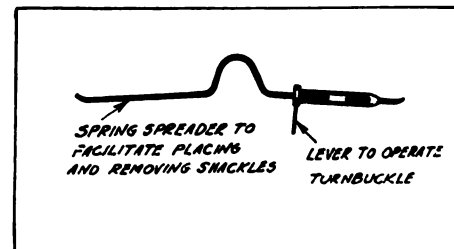
* * *

For Placing and Removing Shackles.

The device shown in the illustration has been found effective in placing and removing spring shackle bolts when changing front or rear constructions on Ford cars. It is simple, but it is said that with it one man can do the work more easily and

much faster than two men did it before.

It consists of two round iron bars, shaped as shown, with pointed ends which fit back of the spring eyes. A turnbuckle compresses the spring, permitting closer alignment of



Turnbuckle Compresses the Spring.

the spring eyes. For rear springs, an arched rod is used to clear the differential housing.

This device can be used on the front spring by substituting a straight arm for the one with a recess.—J. G. G., N. Y.

* * *

A Practical Wrench.

Printing pressmen use a piece of sash-cord, or a similar rope, as a wrench for running down the long clamp-bolts that hold the stereotype plates in place on the cylinders of the rotary presses.

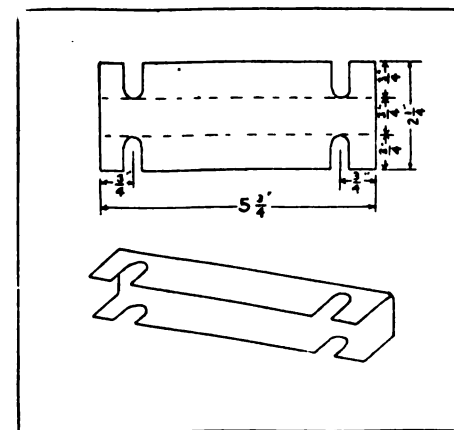
The same idea can be applied to the removal of dust caps of automobile tires, and will be found to be a great time-saver, especially at service stations and garages. The operation is simple and consists in passing a bight of the cord around the bolt or valve, with one end in each hand.

A sharp pull in the proper direction will unscrew the part to be removed or tighten it.—D. V. W., Tex.

* * *

Ford Cylinder-Head Bolt Holder.

The two rear cylinder-head bolts of the Ford cannot be lifted out until the head is moved forward and so are rather bothersome when removing the head. A handy tool can be made from a piece of sheet metal as shown in the illustration.



Made From Piece of Sheet Metal.

When using this tool, the bolts can be lifted enough to clear the engine and can be held so that the workman need not watch them while removing the head.—S. E. G., Iowa.

Readers' Questions and Answers

Installing Vacuum-Gravity System.

I wonder if you will give me, through the columns of your paper, instructions for the installation of a Stewart vacuum-gravity system? Any information that you can give me will be appreciated.—L. R. A., Tenn.

Insert the fuel pipe into the gasoline tank and run it to the bottom of the tank. The suction pipe should be tapped into the manifold at a point which is as near to the cylinders as possible.

Make a small vent in the tank filler cap in order that you may always have atmospheric pressure in the main tank.

Trouble because of sediment deposits in the main container is avoided by means of a screen which is located at the end of the fuel pipe.

* * *

Cylinder Boring Machine Profitable.

Will you please tell me if you think a cylinder boring machine will pay in a small town of about 400 population, with a good farming community surrounding it? Also, are there any that are adjustable from 2½ to 4½ inches? I mean the kind you can use in a drill press or by hand, with a long wrench like a tap wrench.—T. W. K., Ill.

Investigation indicates that you would find that it would pay you to install such a machine in your garage shop.

One of the large manufacturers of equipment of this type states that he considers the prospects for business for the owner of such a machine as particularly good. This same manufacturer is offering a special proposition in connection with the cylinder boring machine which he manufactures, that makes it possible for the purchaser of such a machine to handle automobile repair-work for a radius of miles around his shop.

His cylinder boring machine is adjustable from less than 2½ inches to more than 4½ inches, the specifications mentioned in your letter, and sells at a very reasonable figure.

* * *

Worn Crankshaft Pins.

We have had some trouble in satisfactorily lapping crankshaft pins which have worn out of round. Possibly you can give us some good suggestions on handling this job.—R. T. O., Minn.

We understand that the procedure we are describing has proven very satisfactory. Possibly you will find it helpful also.

Get a couple of pieces of hard wood which are as wide as the crankshaft bearing is long. The wooden pieces should be 14 inches in length.

Clamp these pieces in a vise and bore a hole, which is ¼-inch larger than the crankshaft pins, through the pieces of

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

wood. Half of the hole should be in each piece.

Get a piece of leather, ½-inch thick and line each half of the hole with it. A piece of leather attached over the ends of the wooden pieces will serve as a hinge and a piece of emery cloth should be fitted inside the opening.

Next lubricate thoroughly with a light oil and clamp around the pin. Put the crankshaft in a lathe and turn—not too rapidly. It requires only a slight pressure upon the clamp to reduce the high places on the pin.

* * *

A General Garage Business.

The formation of a corporation to carry on a general garage business is being contemplated by the writer and some friends. As regular readers of your magazine, we have frequently been interested in the good advice that you give, and are consequently led to believe that your editorial department makes it a practice to furnish data to those desiring information in regard to the various phases of the automotive industry.

For this reason we should like to have you give us some information regarding the following: The future prospects for a general garage business of this type; whether the spring of 1922 would be an advantageous time to start such a business; the required capital investment in cars, equipment, accessories, tires and parts; the cost of incorporation and attorney's fees.

We shall appreciate any assistance you can give us.—J. H., Neb.

We should say that the future prospects for a garage business, such as you describe, were never better; that is, if you want to operate a real garage and sales-room on a businesslike basis.

The indications are that business conditions are going to be better and, therefore, the near future would be a good time to open the business.

It would seem that the capital investment in cars, equipment, accessories, and tires and parts might be divided about as follows: Cars, \$25,000 to \$50,000; equipment, \$5,000; accessories, \$5,000; tires, \$5,000 to \$10,000; parts, \$20,000 to \$50,000.

The cost of incorporation and attorney's fees would vary in different states. In Nebraska, for instance, it is from \$200 to \$500, depending upon the amount of the capital stock.

It is better to incorporate in the state in which the company operates.

* * *

Motor Generator Set Might Aid.

In looking through the December issue of the AMERICAN GARAGE & AUTO DEALER, I noticed you wanted some questions, and I have some to ask.

I want to know of a good economical battery charger to be used on 110-volt direct-current line. I am now using a lamp bank made of carbon lamps and the current costs me 15 cents per kilowatt.

There are about 150 batteries in this territory and four battery stations in town. I get my share of the business, but I want to know if there is a more economical way of charging.—T. W. K., Ill.

The matter of charging storage batteries efficiently from constant potential direct current circuits is dependent upon the number of storage battery cells that may be readily charged in series.

If the direct-current circuit is operating at a potential of 110 volts, it will be possible to charge roughly 44 storage cells in series, or 14 sets of the more common type of automobile starting and lighting battery; viz., the 6-volt type.

When 44 cells are connected in series, very little regulating resistance is required and, at the completion of the charge, the regulating resistance will be entirely cut out. As the number of cells in series is decreased, the amount of resistance required for proper regulation of charging current strength is increased and the efficiency of the arrangement is reduced.

In order to charge one set of three cells from a 110-volt direct-current circuit, it would be necessary to have in series with the three cells the equivalent of 11 32-candlepower 110-volt carbon lamps.

There is no charging device, however, which is of satisfactory efficiency for this class of service unless the voltage of the battery to be charged is always the same, in which case a direct-current motor direct-connected to a direct-current shunt-wound generator is used and the generator is equipped with a field-regulating rheostat of more than the usual range of resistance.

With such an outfit, efficiency ranging from about 60 to 90 per cent, depending upon conditions, may be realized.

The first cost of a motor-generator set, however, should be carefully considered, as it may be possible that the added efficiency secured will be more than offset by the additional fixed charges incurred.

* * *

Grind in Ford Motor.

I would like some information. I have a Ford which had the oil drain dented in but not enough to make the magnets stick. I took the motor out of the car and, after putting it back, a grind developed.

When it was in high speed, if I rested my foot on the low-speed lever, it would stop. The sound was a humming grind. There were no marks to show where anything had been rubbing. Everything seemed to be O. K. except for the noise. Could a spring crankcase cause this noise and, if so, why only on high? It did not make any noise on any other gear.

When we put the engine together, every bolt-hole fitted perfectly. If you could give me some light on this, I would appreciate it very much.—R. L., N. D.

An Illinois subscriber has submitted additional information in connection with this query, which was published in our December issue, as follows:

The trouble lies either in a worn rear main bearing or a too closely-spaced magneto. This statement is based upon the fact that a pressure on the low-speed lever stops the grinding. There is enough wear in the main bearing to allow the whole transmission to move forward so that the magneto comes into slight contact with the spool faces.

If a new main bearing has just been put in, the magneto is spaced too close to the spools and there is enough lost motion in the transmission to allow it to go that much farther forward when the clutch-shifter spring gets in its forward pushing action after the foot pedal and the emergency brake have released it.

There could be a loose magnet-clamp screw or two, which allows a slight contact between these particular magnets and the spools, but the trouble has to be right there else a pressure of the low-speed foot pedal, which has a tendency to draw the magneto back away from the spools, would not stop the noise.

* * *

Timing Hupmobile Valves.

Please send me at once complete instructions on how to time the valves and ignition on a Hupmobile. I have one that does not work right and think it is timed wrong.—W. H. R., No. Dakota.

The center line is marked on the flywheel, shown in the accompanying diagram of production of power.

The markings at the center line mean inlet opening, exhaust closing on No. 1 and No. 4 cylinders. In setting the timing, it is necessary to place this line in center. In order to do this, it should be set $2\frac{1}{2}$ inches from the side of the large stud in the engine base, just above the flywheel.

Note carefully that the measurement is

to be taken from the side of the stud to the center line marked on the flywheel. With the flywheel in this position, the camshaft should be set so that the intake valve on No. 4 cylinder is just opening and the exhaust valve just closing.

With the crankshaft and camshaft in this position, the chain should be put on. The flywheel should then be moved two inches past center. The spark is set so that it will fire on No. 1 cylinder with the distributor block of the igniter pointing straight toward the radiator and the spark lever on the steering-wheel quadrant half way up.

If the charge were ignited the instant the circuit was broken in the igniter, regardless of the speed of the motor, the spark could be very easily controlled and changing the position of the spark lever on the steering wheel would not be necessary, but such is not the case. A lapse of time occurs from the instant the circuit is broken until the charge is ignited in the cylinder. This lapse of time is but the merest fraction of a second; in fact, almost infinitesimal, but it must be taken into consideration in the production of power.

Therefore, when it is desired to run the motor at high speed, it is necessary to start the ignition process earlier because of this lapse of time. This is accomplished by means of the spark-control lever and should be watched carefully by the operator. When the spark is advanced too far, a slight pounding noise in the motor is the result. This pounding is sometimes not noticed by the beginner as it is usually very slight, owing to the substantial construction of the crankshaft and, by the uninitiated, it is often accepted as permissible.

Advancing the spark too far is very in-

jurious because by it, bearings, crankshaft, connecting rods and pistons are required to withstand stresses greatly in excess of those produced when the ignition occurs at the proper moment. It also causes overheating of the motor. The spark should be advanced just far enough that there will not be a spark knock under the particular conditions under which the motor is operating and still give the best running results.

When a spark is not advanced as far as it should be, it is called a retarded spark. With this condition the charge is not exploded until after the piston has reached its highest point, compressed the charge, and has started again on its downward movement, permitting the gas to expand. When ignited in this condition, the force of the explosion is materially reduced and a great deal more gasoline is required to produce the given amount of power than when the charge is exploded just as the right instant.

With a retarded spark and late explosion, the combustion or burning of the charge of gasoline is not complete and causes a great amount of carbon to be deposited on piston heads, spark-plugs, etc. It also causes the motor to heat abnormally, resulting in the burning of the valves and valve seats.

When the charge is ignited at just the right moment, the combustion is practically complete, so that when the exhaust valves open a thoroughly-burned charge passes out. When the ignition is late, the charge is still burning when it passes through the exhaust-valve opening and tends to heat, burn, and cause pits in the valves and valve seats. In time, this creates a condition which prevents valves from seating properly or fitting tightly and, therefore, a loss of compression and a corresponding loss of power in the engine is the result.

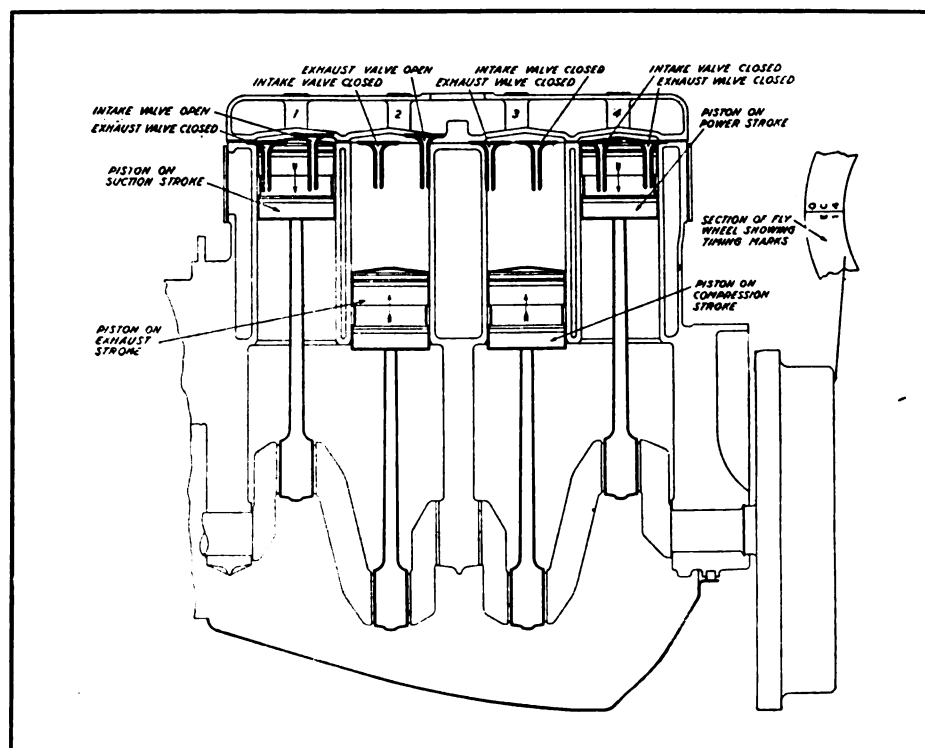


Diagram of Power of Production of Hupmobile.

Here and There in the Motor World

A Boy That Does More Than a Man's Job.

"Boys will be boys," but here is one boy, who, aside from the fact that he is a boy, is so different from others that his efforts



A Clever Boy Salesman and His Slate.

and remarkable achievements are worthy of mention.

This chap holds down a job that would tax the skill of the most experienced man specializing in any one of the many lines that this boy is called upon to take care of every day and night of every day in the year.

This boy is a salesman and a clever one. He is an entertainer and a brilliant one; he is a philosopher and a good one; he is an adviser and a worthy one. He does all of these jobs willingly, cheerfully, and thoroughly."

If you have never seen this boy nor heard of him, you will be interested to know that he is made entirely of wood and stands over six feet high. He does all of his work on a large old-fashioned slate, which

he holds in his hands, and upon which the dealer who displays him chalks a clever, witty saying every other day or so. The boy and slate sign is creating unusual attention for the hundreds of dealers who are using it.

The epigrams, which are funny, interesting, instructive and timely, are a part of the sign service—enough of them being supplied for an entire year—a new saying every other day.

The immense size of the boy and slate, and attractive colors in which he is painted, together with the clever sayings, are bound to attract the passerby to the dealer's place of business. Here are a few samples of these sayings:

It's the men who really follow the fashions.

Hot words cause much coolness.

Big Bluffs have no real estate value.

All dumb bells are silent.

With shocking styles many are willing to be shock absorbers.

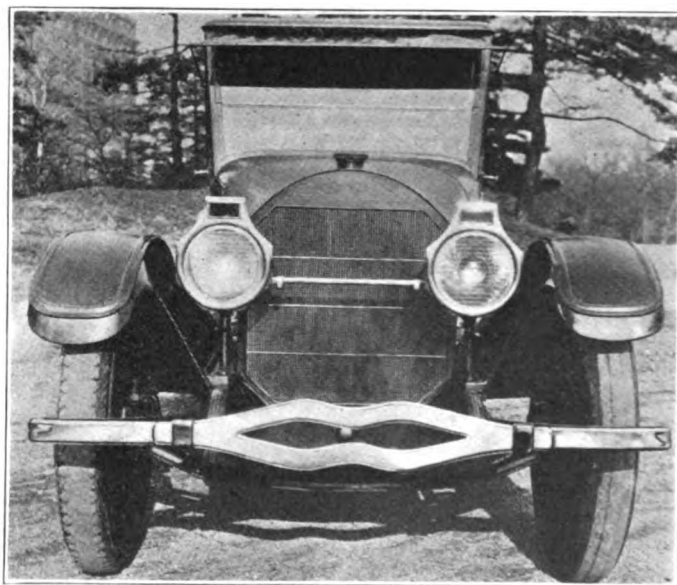
Like postage stamps, people stuck on themselves lose their value.

Dealers should send for particulars of this unique copyrighted selling plan. Address: The National Refining Co., 704 National Bldg., Cleveland, Ohio.

New Lyon Bumpers on Exhibit at New York and Chicago Shows.

The Metal Stamping Co., of Long Island City, N. Y., manufacturer of Lyon bumpers, exhibited at the New York Show and will occupy spaces 100-101 at the Chicago Show, which begins January 28.

Not only will the Lyon straight bar resilient bumper—known as the Lyon standard—and the Lyon convex bumper be shown, but also the new Dreadnaught



New Dreadnaught Lyon Bumper Shown at National Shows.

bumper and the new double bar bumper for Ford cars.

Resilient tests will be conducted with a spring machine which will prove the resiliency of these bumpers. Another new article of interest to dealers will be a portable display stand, mounted on casters. When rolled in front of an automobile it shows instantly the appearance of the car when equipped with a Lyon bumper. It is valued at \$25 but is furnished to dealers with orders for 25 bumpers.

The Cross Country Locomotive—It Is Not An Automobile.

This extraordinary looking vehicle is not an automobile—it's a gas-propelled locomotive. Its designer has named it "The Cross-Country Locomotive."

Though it has a gasoline engine like an automobile, and runs over roads on automobile tires, it is not an automobile in disguise. Almost every part, from frame to whistle, was especially built and designed by the man who conceived it, F. A. Sternad, designing engineer of the Chicago Solder Co., Chicago.

Every locomotive feature has a part to



The "Cross-Country Locomotive" Was Designed and Built by F. A. Sternad, Designing Engineer, of Chicago Solder Co., Chicago.

play in its operation. The cylinder and connecting rods on the sides, that correspond to the driving parts of a steam locomotive, are actually pumps that compress air up to 125 pounds pressure in the tank behind the cab. This compressed air is used to inflate tires and to blow the whistle. The "steam dome" in front of the cab affords access to the gasoline tank. The "sand dome" provides an opening for ventilating the motor. The "smoke stack" is the opening to the radiator. What looks like "clean out doors" forward of and just below the cab, are handy ventilators for the cab; the "air-brake cylinders" above these doors are an auxiliary air supply for the whistle.

The frame, front and rear axles, cone

clutch, transmission and radiator, were all built by the designer. The universal joint is of a special construction patented by Sternad. Gears are always in mesh—two speeds forward. The driving ratio is 3.2 to 1. The carburetor is a Schebler model L. The wheel base is 20 inches. Even the tread is special—52 inches. The four cylinder, 40 h. p. Rutenberg motor will drive the "Cross-Country Locomotive" at a speed of 60 miles per hour.

Sternad spent four years building the "Cross-Country Locomotive." He could devote only his spare time to its design for, during the day, he was occupied by a more practical task. As designing engineer of the Chicago Solder Co., he was designing and building special machinery for manu-

facturing Kester acid-core wire solder, the product of this concern.

Kester acid-core wire solder is a self-fluxing solder. The flux is contained in little pockets in the hollow wire of genuine tin-and-lead solder. Just before the solder melts, the flux is released and flows out on the job. The automatic application of the right amount of the right kind of flux at the right time assures a perfect bond every time, cuts soldering time in half, and enables the unskilled workman to do expert soldering.

Colored photographs of the "Cross-Country Locomotive," or free samples of Kester acid-core wire solder will be mailed on request by the Chicago Solder Co., 4201 Wrightwood Avenue, Chicago.

Accessories—Dealers' Key to Profits

Mr. Dealer! Duluth Equipment Means Well-Displayed Stock.

The power of proper display and store arrangement is probably receiving more consideration from progressive merchants at this time than at any previous period.

The equipment shown in the illustrations is the product of the Duluth Show Case Co., Duluth, Minn., and represents only a few items in their complete line, which includes display cabinets, shelving and drawer cabinets for the effective display and storage of automobile accessories, electrical goods, hardware and similar lines.

In one of the illustrations is shown the "Duluth" No. 421 combination, which is

made up in three sections, and with a top or cornice. It is the flexibility of "Duluth" equipment that makes it so practical for the average merchant.

You can start with one section like that shown in the illustration and add to it as the conditions of your business warrant. For instance, combination No. 421 represents a comparatively small investment in money to the dealer and allows effective and attractive display, as well as providing liberal storage space in the drawers and on shelves behind the swinging doors.

The "Duluth" No. 438 combination can be set right alongside of the first one, or can be used as a single unit. It is a very practical piece of store equipment for the systematic storage of automobile parts, bolts and many other items that are sometimes so hard to find in the garage or hardware store. The partitions between the bins are removable.

Unit sections of drawers can be put together and any combination desired built up. The drawers are made of galvanized steel, with oak fronts and backs.

"Duluth" store equipment is so complete that every dealer should have full information on it. A letter or a card to the Duluth Show Case Co., Duluth, Minn., requesting information on its 12-24 line will bring complete details and much other information on means of increasing sales through proper display and storage.

Bearing Efficiency and Tensile Strength in Bu-Nite Pistons.

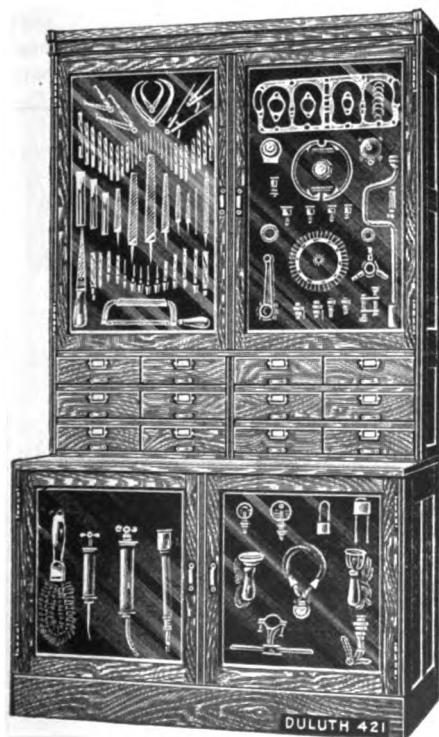
The Bu-Nite piston is not a new piston on the market as it has already had two years' service. The design, as shown in the illustration, is a development that has been brought about by continued practical tests, and the results are gratifying to the extent that the manufacturer—the Butler Mfg. Co., 3234 W. Washington St., In-

dianapolis, Ind.—guarantees to satisfy the customer with the results obtained.

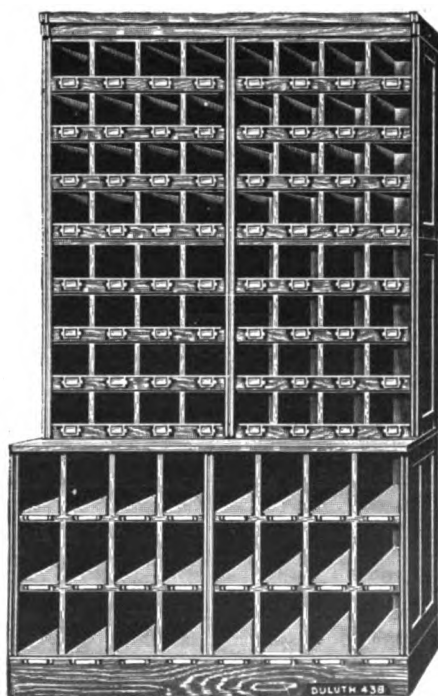
The reduction in weight of a piston is a very important factor. However, it must be taken into consideration by an engineer that the piston is subjected to the extreme heat and the most severe punishment of any automobile part.

The material must be of superior quality, having bearing efficiency, tensile strength and the ability to transfer the combustion heat into the cooling system.

The manufacturer claims that the Bu-Nite piston has these qualifications. The material, being developed from the raw material in the company's foundry, is a known factor and the practical tests have proven the ability of the material to maintain ring

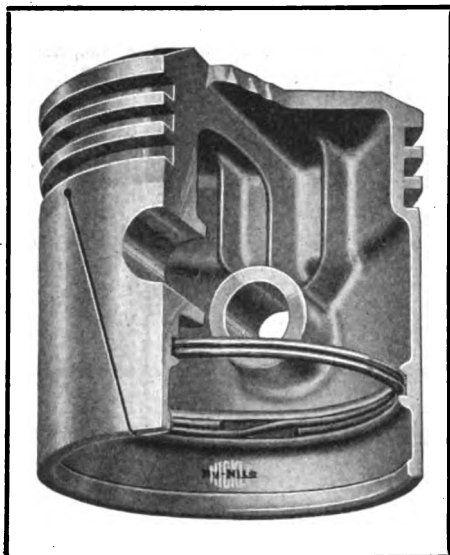


"Duluth" No. 421 Combination.



"Duluth" No. 438 Combination.

seats, piston-pin bearings, and the diameter of piston. The tensile strength and the ability to conduct the heat out of the piston, due to the nickle contents and snug fit permitting contact to the cylinder wall by use



Bu-Nite Construction Rigid and Substantial.

of the compensating skirt and expanding ring are also contributing factors. All these have encouraged the manufacturer to make the guarantee.

The advantage gained by being able to transfer the heat is of no little importance, due to the ill effects of breaking down the lubricating oil and forming carbon under the head of the pistons, which is in turn absorbed by lubricating oil causing excessive wear on bearings and moving parts.

The Bu-Nite piston is of a rigid and substantial construction—the lightness of weight being obtained by the material used—and does not require reinforcements, which cause thick and thin sections that are easily distorted by heat.

New Diamond Cord Tire Is Announced for New Year.

Timed nicely with the New Year, the Diamond Rubber Co., Inc., announces the addition of a new cord tire to the fine old Diamond family. It possesses all the qualities which have made the name "Diamond" so prominent among tires for 29 years.

Sun Automatic Spark Regulator and Timer for Ford Cars.

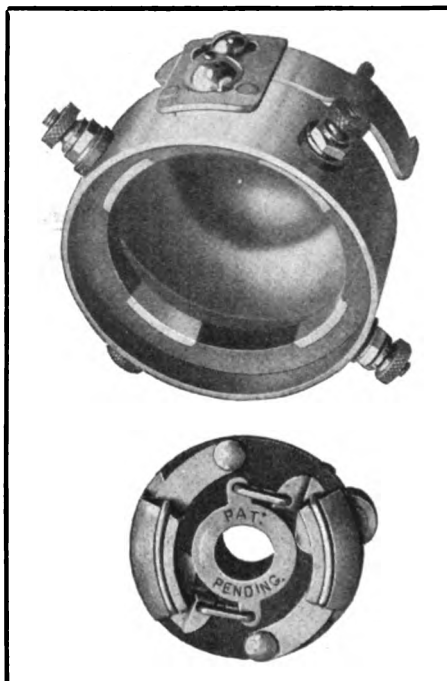
The Sun automatic spark regulator and timer for Ford cars, the development of which covers five years and which—though perfected nearly a year ago—has been kept from the market until it could be thoroughly tested, is now being placed in dealers' hands. It is manufactured by the Auto Sun Products Co., Cincinnati, Ohio.

The device offers Ford owners the opportunity of securing, at low cost, the convenience and saving of automatic spark regulation. It is claimed that it gives the same results for Fords that the new ex-

pensive timing systems are now giving to high-priced cars.

The Sun automatic is made in two parts—the automatic feature and a shell similar in appearance to that of the regular Ford timer.

The automatic feature—shown in the lower of the two illustrations—is an adaptation of the tested principles of governors and centrifugal force. Two weights, the position of which shifts with the speed of



Sun Automatic Spark Regulator and Timer.

the engine, automatically advance or retard the spark. By preventing a spark before the piston reaches dead center, a back-fire is made absolutely impossible, it is said.

The fact that the exact spark is provided

for every speed insures perfect combustion, thus increasing power, saving gas and eliminating the annoying gas carbon from the cylinders.

The spark is provided by the roller-and-segment type of contact. Both roller and segments are of case-hardened steel, minimizing the wear. The raceway is the best-grade fiber, of bone-hard consistency. The shell does not move, making the Sun positively dust and dirt-proof.

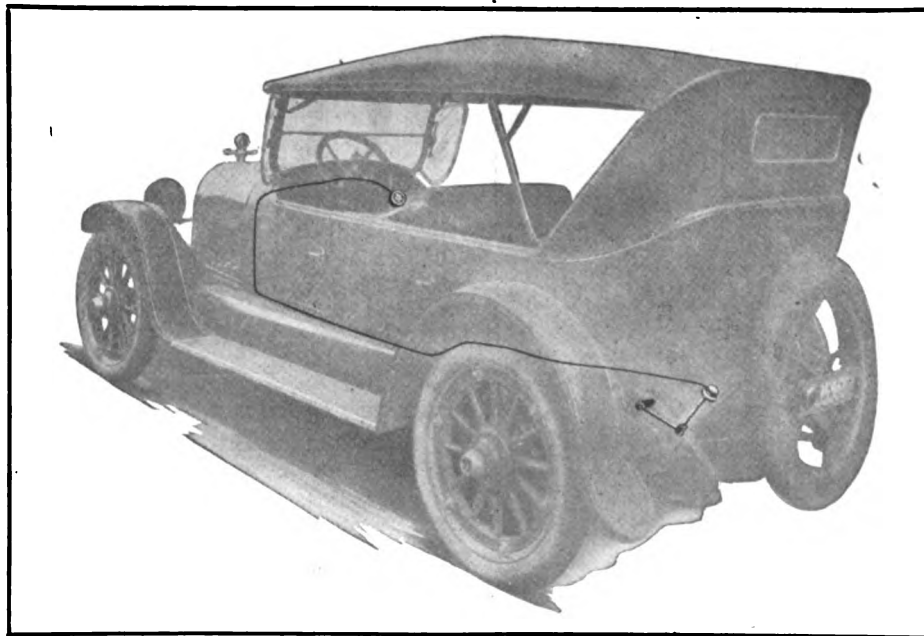
The automatic feature does not wear—it will outlast the car. The only parts that need ever be replaced are the shell and roller. Because a perfect make and break is assured by the automatic feature, because all dirt is eliminated and because the wearing parts are case-hardened, even the shell and roller will give unusually long life.

No Need to Leave Wheel! Gas-O-Meter Gasolene Gage on Dash.

The need of a practical, inexpensive device for actually registering upon the dash the amount of gasolene in the tank has long been felt by every driver of an automobile. The Gas-O-Meter combines the salient features of popular price and entire practicability of operation.

The Gas-O-Meter, which is shown in the illustration, is made by the Mid-West Glass Co., Cincinnati, Ohio. It is built for every type of car except those having the gasolene tank inside the cowl. It is made in two sections—the indicator in the tank and the meter proper, located upon the instrument board.

The indicator consists of a copper, airtight float, attached to a steel shaft, and its operation is similar in principle to the usual form of gasolene gage. The float rises or falls in the tank as the gasolene rises or lowers. This operates a shaft within the main indicator shaft, through the medium of two brass-milled bevel



Registers Amount of Gasolene on Dash.

Make Your Store the Most Talked of in Your Town

The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.

It is **not** given away.

It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

There is absolutely no other way by which you can secure this sign. It and every one of the epigrams are copyrighted. There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

Write today for full particulars. Learn all about the Big En-ar-co Boy and Slate Sign, the epigram service, and the other advertising helps we give our dealers. Be the first in your community to get started. Use the Coupon. Use it Now!

THE NATIONAL REFINING COMPANY

National Headquarters, K-731 National Bldg., Cleveland, Ohio

4 Modern Refineries : 93 Branches

THE NATIONAL REFINING COMPANY,
K-731 National Building, Cleveland, Ohio

Without obligation to me please send full detailed information regarding the En-ar-co "Boy and Slate" and Epigram Service, and other advertising helps.

Name.....

Address.....

City..... State.....

I now sell Oil.



gears. This shaft is mounted upon two bearings. The inside shaft actuates an arm within the indicator head, and causes it to touch upon electrical segments, separate and distinct for each division of the gasoline supply.

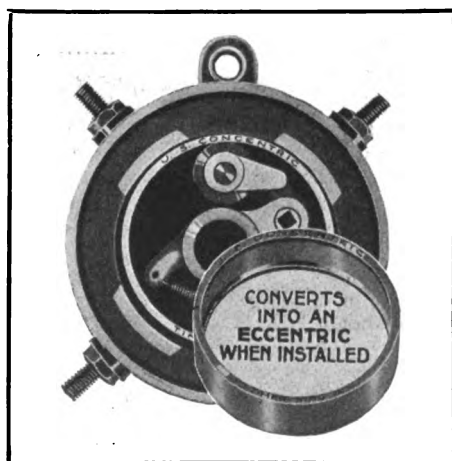
This is the plan followed for measuring the gasoline supply: As the float rises or falls, it turns the indicator arm to the segment showing its location in the tank—empty, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ or full—and, as each segment is connected separately to the dash instrument, the connection established by this indicator arm is in turn shown upon the dash instrument or meter.

The indicating apparatus, which is carefully built and fool-proof, is inserted in the tank in place of the present gasoline gage. From it is run a linen-bound, water-proof cable, containing five wires, which passes under the car to the dash instrument.

A connection is established between the dash instrument and the ammeter and, when the button in the center of the dash instrument is pressed, the height of gasoline in the tank is shown by means of an illumination under the section of the dial which corresponds to the height of gasoline in the tank. Both eighths and quarters register on the meter. When the tank registers $\frac{1}{8}$, both empty and $\frac{1}{4}$ burn. When $\frac{3}{8}$, both $\frac{1}{4}$ and $\frac{1}{2}$ burn.

The meter measures $3\frac{3}{4}$ inches over all. It is composed of the usual connections for the cable at the back, with each connection fool-proof—the cable consisting of five separated colored wires, and the connections on the head are colored correspondingly. There is a resistance coil in the head which "steps down" the current to $2\frac{1}{2}$ volts.

Small flashlight bulbs are used under the etched German silver dial, and these are easily replaced at any hardware, drug



The U. S. Concentric Timer Ring.

or accessory store. On account of the limited use of the bulbs, they will last for many months of hard service before replacement is required.

The device is not "alive" except when the button is touched, as the cable is "dead"

between the dash instrument and the tank, and grounded. No spark can be produced, as it is a well-known fact that $3\frac{1}{2}$ volts or more are required before a spark may be obtained. Neither can any live current reach the tank, as this is prevented by the "dead" cable.

The dial is protected from exposure by a $\frac{1}{4}$ -inch plate-glass crystal, and the head is held in place on the dash by three screws.

The Gas-O-Meter is built with the same sized head for all cars having the gasoline tank at the rear, and with shafts and indicators of different lengths, as the depths of gasoline tanks varies on the different models.

For the "Heart" of the Ford—A U. S. Concentric Timer Ring.

Ford owners and dealers will be greatly interested in a new device which is now being marketed, which it is said will be effective in eliminating the most difficult motor troubles and give perfect timer ignition. In fact, so confident of his product is the manufacturer that this device is guaranteed to give perfect timer ignition for over 50,000 miles or the purchaser's money will be refunded.

This new boon to the Ford owner is known as the U. S. concentric timer ring, and is sold by the U. S. Auto Equipment Co., Milwaukee, Wis. It can be used on every Ford car, truck or tractor.

The U. S. concentric timer ring is an ingenious and simple device, made especially for the Ford timer but is applicable to any standard type of roller timer of Ford style.

The heart of the Ford motor is the commutator or timer. Wear on the Ford timer is caused, says the designer of the U. S. concentric timer ring, by the rapid and continuous electric arc and the friction of the roller on the stationary timer case.

A timer on the Ford car revolves 2,588 times per mile, or 76,640 times per hour when driving at the rate of 30 miles. The U. S. concentric timer ring is designed on the principle that the rapid electric arc thus created causes heat and, with the continuous friction of the roller, destroys the metal surface on all standard types of timers.

This friction, it is claimed, is eliminated by the use of the U. S. concentric timer ring because the ring rolls over the surface of the timer. As this ring revolves in the reverse direction to the commutator roller 104 revolutions per mile or 2,600 revolutions per hour, when driving 30 miles per hour, the contacting surface of the ring against the commutator is constantly changing, thus equalizing wear and practically eliminating arcing.

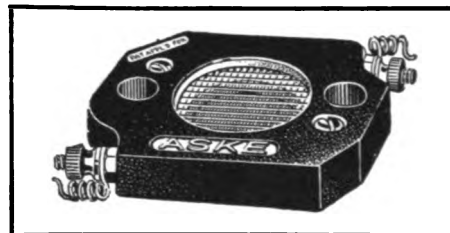
The U. S. concentric ring was evolved after a long period of experimental and research work, and it is said that the results claimed for it have been verified by tests on all types of Ford cars, trucks and tractors for 5,000 miles and more, without any apparent sign of wear, and further that

experimental reports from various sources show that the ignition is always perfect.

One illustration given of its service is that, on a Block test, in 30,000 miles, showed no wear on the roller, timer case or U. S. concentric timer ring.

You Start Easier and Save Battery With Aske Electric Vaporizer.

The Horgan MacDonnell Co., 941 W. Washington Blvd., Chicago, is introducing the Aske electric vaporizer to the trade. This device is made up of enameled copper



Electric Vaporizer Made of Enameled Copper Wire on Porcelain Frame.

wire, wound on a porcelain frame in such a way as to form four durable and non-clogging grids which are encased in a cover of Thermoplax—a high heat-resisting compound of great mechanical strength. The whole, when placed between the carbureter and the intake manifold, and charged by a carefully predetermined current of electricity, serves to heat the incoming mixture and thus makes starting instantaneous, it is said, saving wear and tear on the starting battery.

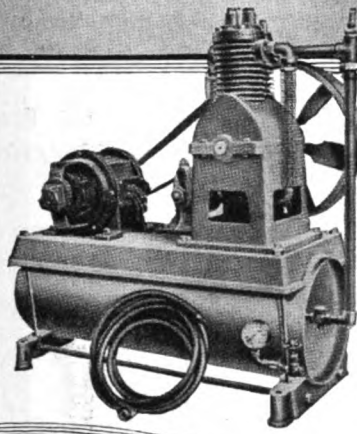
It is also said that the mixture is heated to such a degree that using the choke is unnecessary. This eliminates the drawing of a raw mixture into the cylinders, with the attendant evils of condensation and crankcase oil dilution. After numerous tests by some of the large automobile and truck owners, the claim is made that the device increases mileage from 20 to 50 per cent and power up to 35 per cent.

The current does not flow through the wires continuously but after the engine is started, it is switched off and the criss-cross wires of the grid have the mechanical action of subdividing the fuel particles into a finely atomized state. Some very interesting literature is available to jobbers and dealers on request to the above address.

New Jack Arouses Interest In Chicago Automotive World.

So enthusiastic has been the reception of Chicago garages, repairshops and salesrooms towards a dolly jack recently introduced that already several hundred jacks are in operation in that city alone.

The new jack—the Yellow Jack-It—has a number of exclusive features, it is said, that adapt it particularly to congested quarters and where severe use is a common thing. It operates with the handle in line with the main-frame, turned at an angle to it, upright, down or even inclined over



CURTIS *Single Stage and Two-Stage* AIR COMPRESSORS

Curtis Single-Stage Compressors—the most popular everywhere. Have controlled splash oiling system—runs ten to fifteen times as long on same amount of oil. Fan flywheel—aids in keeping cylinder cool. Hand unloader—prevents blowing fuses and jumping belt. Head removable without loosening pipe connection. Also many other exclusive features. Several styles and sizes.

Curtis Two-Stage Compressors have same features that established our single-stage so strongly and in addition have all possible advantage of two-stage compression. Exclusive Aeroplane type COPPER intercooler with thin radiating fins rigidly attached assures fullest advantage of two-stage compression. Several styles—two capacities.

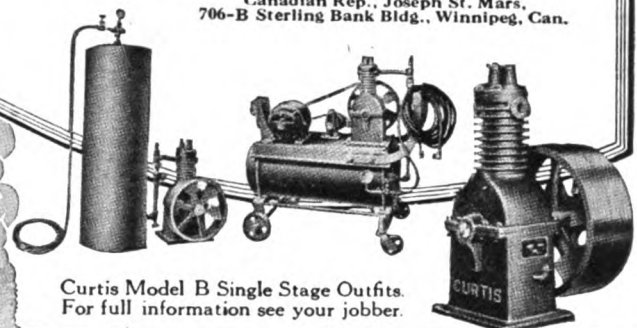
FREE
CURTIS AIR
FREE FROM OIL

This Curtis Sign—14x20 inches—baked enamel on heavy steel. Furnished at small cost to users of Curtis Garage Air Compressors.

Curtis Pneumatic Machinery Co.
1515 Kienlen Ave. St. Louis, Mo.

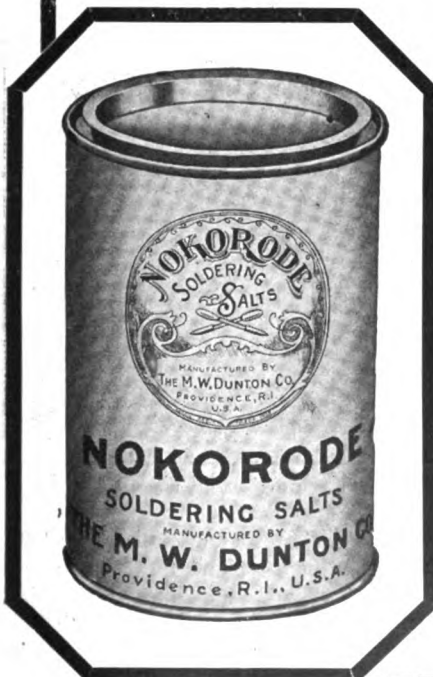
Branch Office:
530-U Hudson Terminal, New York City

Canadian Rep., Joseph St. Mars.
706-B Sterling Bank Bldg., Winnipeg, Can.



Curtis Model B Single Stage Outfits.
For full information see your jobber.

NOKORODE versus ACID MEANS Satisfaction versus Corrosion



NOKORODE SOLDERING SALTS is as easily applied as acid, makes just as secure a bond and is absolutely harmless to both the work and the worker. It would be difficult to over-estimate the value of the automotive parts that have been ruined through corrosion caused by soldering preparations containing acid. NOKORODE is (as its name implies) absolutely non-

corrosive and harmless to metals. One lb. cut with a gallon of water will solder all metals, and will not burn the mechanic's hands or clothing.

This is one of the reasons why so large a percentage of automotive manufacturers use NOKORODE.

Order a trial can under our guarantee offer using the coupon below.

THE M. W. DUNTON CO.
Providence, R. I. U. S. A.

The M. W. Dunton Co.,
670 Eddy St., Providence, R. I.

Gentlemen:—

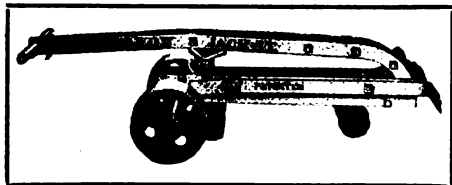
Enclosed find \$1.00 for which please send me a one-pound can of Nokorode Soldering Salts. It is understood that these Soldering Salts will satisfy me in every way, or you will refund my dollar.

Name

Address

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisements.

the frame; elevates through a series of short, easy depressions instead of one full, strenuous depression; holds its load se-



Yellow Jack-It Elevates Trucks Successfully.

curely at all points so that the handle cannot fly back; and folds when not in use.

The Yellow Jack-It is especially advantageous in shifting the position of cars in crowded quarters or wherever a really sturdy jack is required. It is claimed to be the only jack that elevates trucks successfully, and is made in three capacities, each fitted either with metal or fiber wheels. The new device, which will be exhibited at the Chicago show, is distributed by Yellow Jack-It Bunnell Co., 9 S. Clinton St., Chicago.

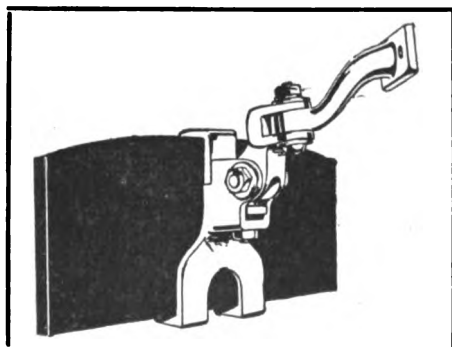
Beauty and Utility Combine in "Chief" Automobile Mirrors.

It is said of the "Chief" automobile mirrors that they were built to sell on their merit in the beginning and that they have "kept the faith."

When you see the "Chief" mirrors, you will readily understand their popularity with motor-car owners.

For one thing, there is no rust or rattle from a metal frame, as the mirror is held securely by ingeniously-designed clamps which provide unobstructed vision on the entire mirror. Every bracket is interchangeable, so that you can fit any model car—open or closed. The brackets are made of the best quality aluminum composition, highly polished and will not discolor, rattle or deteriorate.

The glass is the best French crystal plate, with narrow, non-reflecting, beveled edges, and is highly polished. The silver-



One of Many Attractive Types of "Chief" Automobile Mirrors.

ing is of the highest grade, and is protected against climatic conditions by a special process that makes it immune to dampness and salt air and prevents it from blistering, separating from the glass, or developing unsightly black spots.

Mounted firmly upon padded glass-holder aluminum clips, the mirror is held securely against the jar from rough roads by "Ear Pocket Members" with lock glass-holders of patented construction. They fit tightly against the mirror, and prevent scratching by bringing the leverage to bear on a heavy gasket rather than on the glass itself.

Designed to provide quick, positive adjustments at every angle, the brackets can be instantly adjusted without tools to any angle or position the driver—whether short or tall—may choose to occupy, without altering the mirror's fixed position on the car.

"Chief" mirrors are made in a number of styles, which are all most attractive. The interchangeable brackets on these mirrors make it easy for the dealer to carry a stock with which he can please even the fussy driver.

Summed up, there are these outstanding features about the "Chief" mirrors: They are adjustable to every angle, non-vibrating, weather-proof, quality merchandise, attractive in appearance, durable and dependable.

At the Chicago Show, the "Chief" mirrors will be exhibited on special bodies of the Packard, Pierce Arrow, Lafayette and Lincoln cars.

The illustration furnishes an idea of their attractive appearance, but you will want to know more about the various styles and their prices, all of which information may be obtained by writing the Britton Auto Products Co., Inc., 117 West 63d St., New York, N. Y.

Oval Stop Signals Cannot Rust and Will Not Rattle.

The Oval stop signal, a new signal device, is being placed on the market by The Silva Mfg. Co., of Cincinnati, Ohio.

The materials used in this new signal make it impossible for the Oval to rust, it is said, while the parts have been assembled in such a simple, compact manner that it cannot rattle nor can dust or water get inside. The Oval will outlast the car it guards.

Every part of the lamp is of heavy gage brass, heavily nickel-plated. The inside carries a beautiful silver mat finish, while the outside is finished in either highly polished nickel or double-coated with high-heat baked black enamel. Either finish will withstand all weather conditions.

The word "Stop" is embossed on the best-grade ruby glass with fire-baked black enamel background to make it visible in both daylight and darkness. A 21-candle-power bulb furnishes the flash.

The switch is of a patented design, working like the hook of a telephone. Contact is certain—it cannot stick.

The signal derives its name from its "oval" shape. This specific design was de-

cided upon after a wide investigation which showed that the oval shape harmonized best with the lines of an automobile.

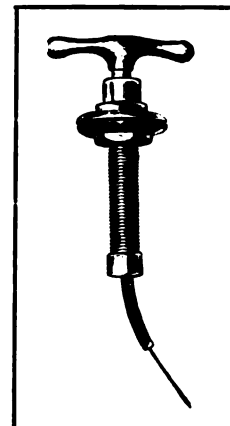
New Cooper Dash Control Places Control Where It Belongs.

A patented dash control for muffler cut-outs, air chokes, radiator shutters, heater valves, etc., is a new product of the Cooper Mfg. Co., of Marshalltown, Ia., makers of the famous Cooper Special cut-out.

This dash control is a beautifully nickled device, installed by boring a single 1/2-inch hole in the dash. It is operated by pulling on the "I" handle and locking it in any position by a slight twist.

Its handiness and convenience is evident, for it places the control where it belongs and leaves the floor-board of the car free for removing without disconnecting the device.

The new dash control, complete, is being sold at an exceptionally attractive price.



Cooper Dash Control.

Diamond Rubber Co. Chooses New Sales Head.

Along with new models of tires and new tire features, new sale policies and a new year, the Diamond Rubber Co. of Akron, Ohio, announces a new director of sales, H. E. Keller. He will have control of the sales of all Diamond products.

The officers of the company have a



Cannot Rust—Will Not Rattle.

formidable sales program outlined for 1922, one that is built around the bringing out of new tires and new ideas for selling them. Mr. Keller was chosen as the director to put through what is planned to be Diamond's greatest year of sales.

SIX PROFITS FROM USING THE STERLING HIGH RATE DISCHARGE CELL TESTER

Sterling
No. 600
Cell Tester
Price \$8.00



- (1) Finds the trouble quickly without removing the storage battery from the car.
- (2) Provides an accurate test for each individual cell.
- (3) Saves attempting to charge a defective battery.
- (4) Shows your customer when he needs a new battery.
- (5) Prevents fraudulent exchange of a poor battery for rental battery.
- (6) Durable, trouble-proof, anyone can use it after five minutes instruction.

"LOW, FAIR, GOOD OR HIGH"

—the Sterling Magneto Meter tells at a glance a magneto's condition. For convenience and speed in testing Ford Magnetos use the Sterling. No experience is necessary. Equipped with double contact connector for quick tests. For very accurate tests while car is being driven, leads are connected to terminals on the magneto meter. Will quickly save its cost in time saved.



STERLING MAGNETO METER
PRICE \$8.50 COMPLETE

For full information write for Bulletins. If your jobber does not handle Sterling Products send your order direct to us, stating the name of your jobber.

The

Manufactured by

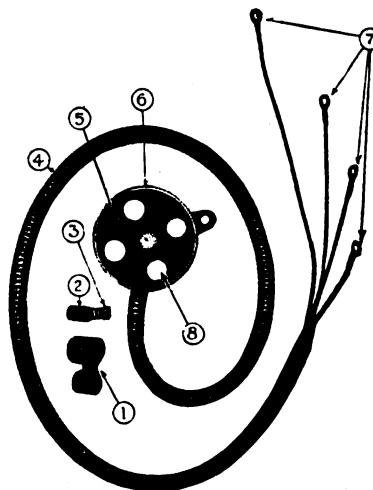
Sterling

MANUFACTURING COMPANY
2849 Prospect Ave., Cleve and O.
Largest Producers of Dash Ammeters in the World.



For
FORD
Cars,
Trucks
and
Tractors

TURNER (2 in 1) TIMER



A fast selling product that will give lasting satisfaction to every Ford owner. Made for Ford cars, trucks and tractors. Assures an easy start in any weather, lessens fouling of two front plugs, saves gasoline, stops "kicking", is oil, grease and water-proof. Requires no oiling and is easily installed.

1—Brush container is of special alloy metal, and will last indefinitely. 2—Contact brush of specially treated phosphor bronze. 3—Contact spring is of high grade piano wire telescoping type. 4—Flexible metal conduit cord packed, which entirely houses all wires. 5—Genuine Bakelite insulated Timing Disc. 6—Timer shell of aluminum alloy. 7—Note the four different lengths of wires, the only wires that you have to connect. 8—Hardened brass contacts of best quality is used. Timer and wire assembly complete\$4.50

TURNER SPRING LEAF SPREADER AND LUBRICATOR



—Greatly increases riding qualities of any car, stops squeaks and spring breakage and increases spring wear. Makes steering easier and saves tires. The only device made that spreads spring leaves and lubricates them in one operation without fuss or muss. The grease goes just where it is needed and nowhere else. For all cars. Price\$2.50

For convenience of car owners we furnish one pound cans of special spring lubricant for use with our lubricator. Price\$1.50

TURNER SAFETY LIGHTING WIRE ASSEMBLY—

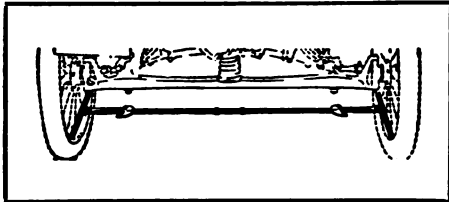
Beautifies the car and protects it from the greatest source of automobile fire loss. All enclosed by flexible metal conduit. Water, grease and oil-proof. Eliminates short circuiting. No bare wires to cause road repairs from magneto shortage. Can be installed by anyone in ten minutes. For cars with starter, \$2. For cars without starter, \$1.50.

TURNER MANUFACTURING CO.
KOKOMO, INDIANA

Up-to-the-Minute Garage Equipment

Garageman Finds Aid to Service in Bear Automatic Wheel Aligner.

It has often been said that lack of business success can many times be traced, in no small measure, to the little leaks. It is equally true that failure to do a paying business may many times be laid at the



Automatic and Registers Instantly.

door of the failure to see the profits in small repairwork jobs.

To the garageman, repairman or dealer who is ever eager to see the opportunities for increasing business and giving better service, the Bear automatic wheel aligner will point the way to extra work which he may now be overlooking and which offers a goodly amount of business.

All wheels get out of alignment and the aligner should be used on every car that comes to the garage. Improper pitch means worn or defective parts and requires replacement. The Bear automatic wheel aligner detects bent axles, defective spindles, spindle bolts, bushings and wheels.

Improper toe-in can be adjusted in a few minutes by adjusting the tie bar after the proper pitch has been obtained.

By showing your customer that you can detect and remedy these faults quickly, efficiently and accurately, in a scientific manner, you can impress upon him the reliability of your service. If you have been using a stick or string for doing this work, you will quickly recognize the value of the Bear aligner.

From the point of view of the dealer, the Bear automatic wheel aligner is equally valuable, for it will protect him from comeback on his tire sales, for adjustment due to improper alignment. Often the tires are not really to blame. Improper toe-in causes the tread to wear off quickly. Improper pitch will cause fabric separation—commonly known as “stone bruise”—caused by undue strain upon the tire when making curves and corners at a high rate of speed and when heavily loaded.

With the Bear aligner, the dealer can demonstrate to his customer in a few seconds that the wheels are out of alignment, and it is all done in so scientific and satisfactory a manner that the customer cannot expect an adjustment and will remain satisfied.

Both front and rear wheels can be properly aligned with the Bear automatic wheel

aligner. It is practically two instruments in one, as it enables any man to get both the pitch and toe-in in a jiffy. Pitch and toe-in work automatically together, and it is just as essential to have proper pitch as it is to have the proper toe-in. Yet, they differ greatly in the different makes of cars.

The Bear wheel aligner is so made that it will telescope and compress, and it is held in position just where it is put by the compression spring. It can be left in position between the wheels, in most cases, while the adjustment is being made.

The dials are so simple that any one can read them—each line on the dial representing $\frac{1}{4}$ -inch on the wheel. The arrows and dials show when the alignment is correct.

Summarized, the important features of the Bear automatic wheel aligner are that: It is automatic; requires no adjusting; no screwing, registers instantly; and eliminates guesswork.

With each aligner an instruction card, showing a list of the popular cars and giving the proper pitch and toe-in, is furnished.

You will want to know more about this instrument and you can secure details and prices by writing the Bear Mfg. Co., Rock Island, Ill.

Saves One Man's Time With Loudon Piston Centering Machine.

After two years of study and experiment by an experienced mechanic and practical piston maker, in an effort to reduce time and waste in his own shop to a minimum, a machine—which is said to present an entirely new idea in piston making—has been evolved.

This machine is the new Loudon piston-centering machine. Evidence as to its time-saving and waste-eliminating possibilities is best given, perhaps, in the testimonials received from users of the machine.

One man writes: “We find your piston-centering machine is doing everything you claimed it would do in the way of time saving. We would certainly hate to go back to the old method of truing pistons in a lathe. The saving on our small orders is one man's time per day, besides getting a perfectly-balanced piston.”

Still another says: “You, no doubt, will be interested to know how your piston-centering machine, which was put in operation in our piston department, is performing. It has been in operation for the past 30 days, and during that time has increased our production on pistons far beyond our expectations.

“As for accuracy, it is absolutely perfect. To test this, I centered a piston on your machine and then turned it down on one of

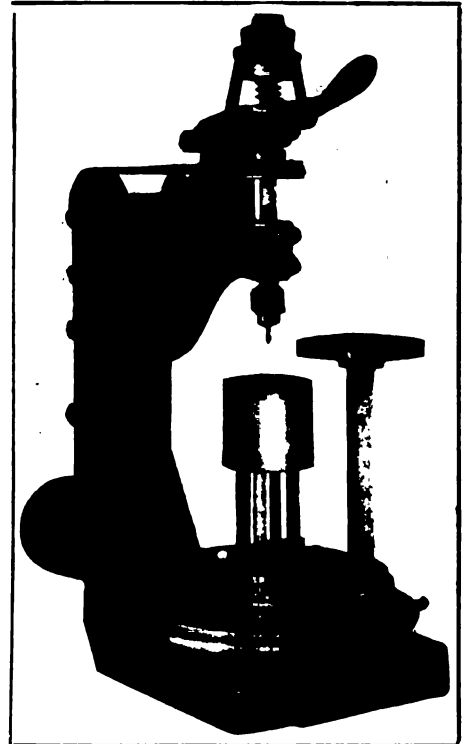
your quick-acting chucks, so thin that I could press the walls in with my fingers, and found that the wall was of absolutely uniform thickness. Considering this test, I am safe in saying that your machine will center a piston within 0.003 of an inch.”

The No. 1 machine is adjustable in a fraction of a minute, to any size casting up to six inches. It is said that it will center perfectly, within 0.005-inch, more castings in a few minutes than the average shop can machine up in a day, and that an apprentice, with little or no experience, can center from two to four castings a minute—120 to 240 in an hour.

It equalizes both core shift and elliptical castings, thus saving all but castings classed as foundry scrap. Further, it saves lathes being tied up while truing up castings and saves hammering, pounding and having to replace costly chucks and jigs.

The table, which makes it an accurate speed drill, capacity 0-inch to $\frac{1}{4}$ -inch, can be attached or detached in a minute's time, and will be found convenient for drilling oil leads or other light work.

Compactness and simplicity are character-



Equalizes Core Shift and Elliptical Castings.

istic of the operation of the Loudon piston-centering machine, and it is being offered at a very reasonable price, in addition to which an attractive time-payment offer is made.

Those interested may obtain full details by writing Loudon, Inc., 107 Western Ave., Minneapolis, Minn.

Does Your Auto-Electric Service Sell Results, or Only Your Hours of Work?

It's a simple case of add and subtract—

One Hour's Time (plus Wells' Auto-Electricians' Handbook)\$4.50
One Hour's Time (plus Lots of Hard Work and Worry) 1.50

Are you losing, or do you want to make the difference of\$3.00

There are forty reasons why Wells' Handbook is the biggest money maker in the electric service shop—here are three of them:

First— PERFORMANCE, ADJUSTMENTS, TEST METHODS, CONSTRUCTION, From 1911 to now, on 1324 models of 270 different makes of cars, for their GENERATORS, MOTORS, REGULATORS, CUT-OUTS.

Second—Real working diagrams, in blue print, of the internal wiring of each unit—with every brush, coil and terminal shown in its actual position as in the machine.

Third— Exact and specific instructions for each different make of machine—with real "brass tack" information and no glittering generalities.

Do you want to know HOW and WHY Wells' Auto-Electricians' Handbook will make money for YOUR shop?

Then write today for sample pages and a complete description.

It's easy to buy—and easy to pay for, too.

AUTOMOTIVE PUBLISHING CO.

448 S. Dearborn St., Chicago, Ill.

41 E. 29th St., New York

Suite 924, No. 18 Tremont St., BOSTON, MASS.

N. F. ANDRUS, 404 Golden Gate Ave., SAN FRANCISCO, CAL.
London, England, Motor Technique Bureau, 149 Strand, W. C. 2

Any Car is a Better Car with a Wickey Battery

A Battery that's different —



THE Wickey Battery does not require the constant care and attention that batteries ordinarily must have.

It is a Semi-Dry, Rechargeable Storage Battery — has no liquid or acid to spill out.

Water is needed only two or three times a year.

The usual wall separators have been eliminated. This brings the semi-solid "Wickey Electrolyte" in complete contact with the plates, which insures an unrestricted and constant path for current.

Plates in the Wickey Battery cannot buckle or burn up.

There is a Wickey Battery for every car guaranteed for three years of service.

DEALERS: Write today for our plan.



WICKY BATTERY CO.

730 Exchange Avenue

EAST CHICAGO - IND.

Dealers - Jobbers - Distributors

F.A.A. CAST IRON & ALUMINUM MENDS

Are in Demand Everywhere

Use F. A. A. MENDS in repairing scored Cylinders, Cracked Water Jackets and Aluminum Crank Cases. They give a solid and permanent result, that is associated with scientific welding.

When you are troubled with a Scored Cylinder, Cracked Water Jacket or Aluminum Crank Case, have it repaired with incomparable F. A. A. MENDS.

It achieves more and costs less than any other.

Give these MENDS a trial or ship your CYLINDERS or CRANK CASES direct to us—they will be returned the same day received.

NO REGRINDING, NO NEW PISTONS, NO WARPING or CRACKING.

Let us send full particulars—Write today.

F. A. ALBERTUS & CO.

206 Ninth St.

Milwaukee, Wis.

1922

Will Be a Big Year For

NEW ERA "Better" SPRING BUMPERS

Motor car owners have discovered that they can put 100% dependence on guaranteed NEW ERA BUMPERS.

And we have added, for those who want the added touch of style, our exceedingly distinguished DUPLEX, built on the same principles as our standard "Better" Spring Bumpers.

You can carry a small stock of both and turn it over many times during this year. You can keep your stock fresh by merely exchanging attaching arms to suit stock on hand. Better than usual business and faster accumulating profits await those who carry NEW ERA BUMPERS this year.

Write for catalog.

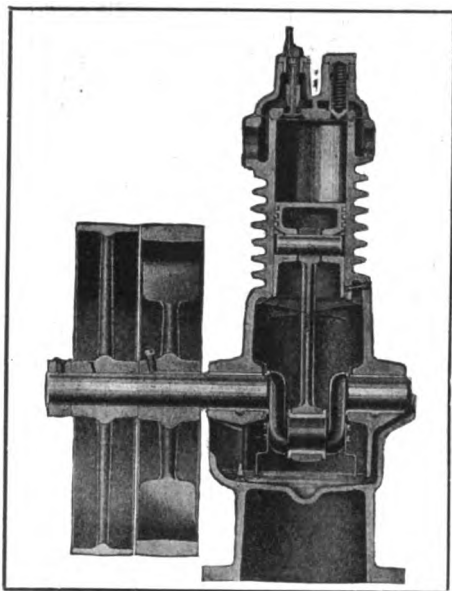
New Era Spring & Specialty Co.

56 Cottage Grove Ave.

Grand Rapids, Mich.

Curtis Compressors Have Patented Controlled Splash Oiling System.

The general construction of a Curtis model "B" compressor—and particularly the method of the controlled splash-oiling system used in these compressors—is seen



Cross-Section Shows Curtis Splash-Oiling System Method.

in the cross-section shown in the illustration.

Note the oil level in the crankcase. A high and low level filling gage is furnished, which does not permit too much oil to be put in and which shows, by looking into the filler, when it is necessary to refill the crankcase with oil.

Neither the connecting-rod nor the crankshaft dips into the oil. On the crankshaft, two knife-blade attachments dip down with each revolution of the flywheel, pick up a drop of oil as it passes through, and throws it off onto the ribs cast on the upper half of the crankcase and also onto the little pin which is shown extending through the lower end of the cylinder wall.

This little pin is the secret of the famous slogan "Curtis Air—Free From Oil." After much experimenting, just the right size pin is used, so as to collect the amount of oil necessary to lubricate the cylinder of the compressor, no matter how much is thrown on it.

The oil that it does collect runs off the end of the pin through a small hole in the cylinder wall. It is wiped off by the piston on its down stroke and carried up along the cylinder wall, then around the wall, where it finds its way into an oil groove around the piston underneath the lower ring. Thus, every part of the cylinder wall is supplied with the proper lubrication.

There are also two oil ducts leading from the oil groove, which lubricate the upper piston pin. The pin, it is declared, cannot and will not collect and deliver an excess of oil to the cylinders to blow over into the discharge line and rot the inner

tubes of automobile tires. There is very little difference between the high and low level points of the oil.

Another feature of this patented oiling system is that one filling of the oil will run a Curtis compressor for an exceptionally long period of time.

The knife-blade and collector-pin oil throwing system is a patented feature and found exclusively in Curtis air compressors. It likewise makes them especially suited for water systems, die casting work, air brush painting and the like, because of no excess getting into the discharge line.

Further information in regard to this and many other good features of the Curtis compressors can be had by writing direct to the Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

Valuable New Piece of Electric Service Equipment.

While the remarkable development of electrical equipment on cars has been so widely talked of that we are all familiar with its wonders, yet the methods by which troubles in this equipment are now handled in the modern service station and the problems encountered by the expert auto-electrician are things that the average man, either repairman or motorist, seldom realizes.

The makeup of a new piece of electric service equipment, "Wells' Auto-Electricians' Handbook," reveals many interesting points about this work, which is claimed to represent from a half to three-quarters of all present-day service.

It is noteworthy that the ability of the men engaged in this work has been recognized by the omission of general instructions and elementary matter so often thought necessary. Both the printed data and the diagrams have been entirely given over to what might be called "service instructions."

This idea has been so completely carried out that, as an example, it is found in the

directions for changing generator output the basic principles are mentioned but briefly while minute instructions cover the exact method of adjustment and tell what movements and changes are to be made in securing the desired result on the particular machine being treated. It is quite evident that this method has been adopted from the type of information now generally furnished by equipment makers to their official service stations.

Some of the difficulties faced by the electrical repairshop not equipped with such a service guide are indicated by an examination of the 42 pages of index in Wells' handbook. The "Car Index" shows the make and type numbers of generators, motors and ignition used on more than 1,300 models of 270 different makes of cars from 1911 to 1922.

A few of the service man's difficulties are evident from the fact that these cars have changed their electrical equipment a total of nearly 1,100 times, which is surely a formidable number to confront without a reference work.

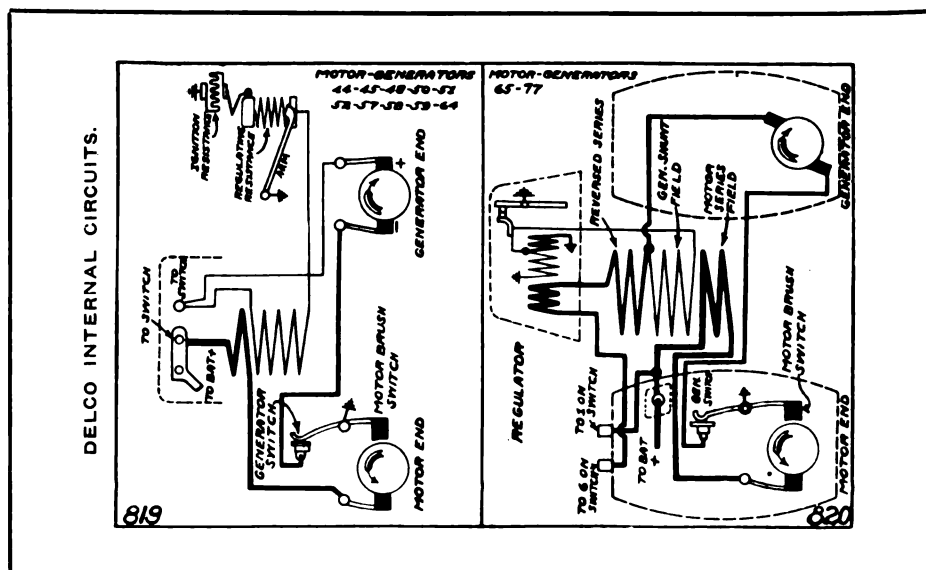
A "Model Index" lists about 900 types and models of generators, motors and motor-generators; this number representing well over a hundred different methods and principles of construction in generators alone. This particular index is intended for use when an electric unit is shipped to the service station after being removed from its car.

The speed with which work may be handled with Wells' handbook was brought out when it was found possible to find any one of the following items of information for any certain car model out of the whole 1,300 in less than two minutes:

Charge Rate: Normal performance under definite conditions; amperage, voltage, speed, etc.

Generator Construction: Field windings, poles, coils, brush positions, commutator and armature construction, etc.

Testing Terminals: Points at which



In Circuit Diagrams Equipment Occupies the Same Positions as in the Cars Themselves.



Refacing Valves

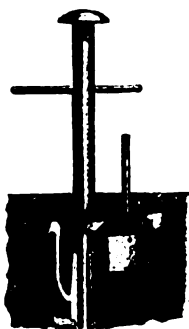
You can cut a true seating surface on a warped tungsten valve head in a few moments with the refacer included in the Skinner Motor Valve Set. Grinder speed and accuracy, at a hand tool price. Fits all valves.

Reseating

The reseater in the Skinner Motor Valve Set takes all valve seats up to $3\frac{1}{8}$ ". Each cutter will outlast many reamers. Pilots extra long. Entire set manufactured under highest machinist's standards.

Write for Skinner Motor Valve Set Bulletin

M. B. Skinner Co.
558-562 W. Washington Boul.
CHICAGO, ILL.



Piston assembled, showing a bent rod, or wrist pin holes out of square with axis.

For Bent or Twisted Connecting Rods —THE— FORT HILL ALIGNING GAUGE

Makes the overhauling work easy and gives the customer a satisfactory job.

Complete with first cost. Simple in operation, taking all work on one arbor. Made as accurately as a micrometer, with only one moving part.

Dyer Pistons, Pins and Rings for replacement purposes are made for all types of motors. Our stock is complete; prompt shipment guaranteed.

The DYER COMPANY

Makers of Garage Equipment

155 Brookline St. - Cambridge, Mass.



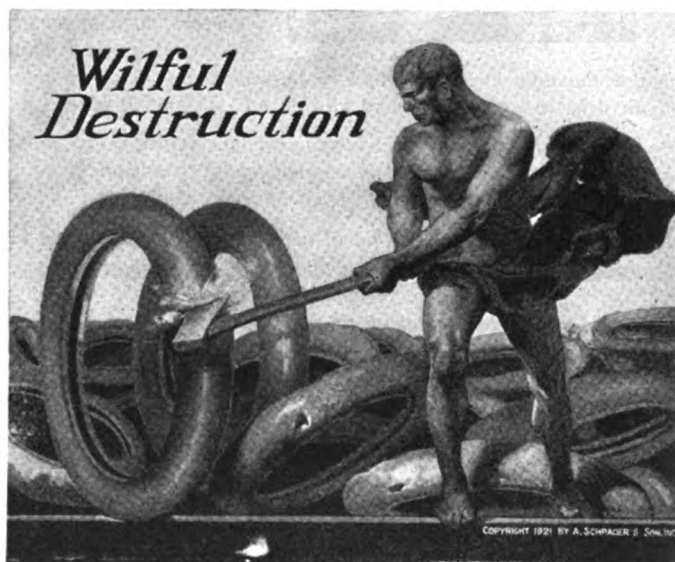
A line that
will pay
you to sell

SUPERBESTOS Folded and Stitched BRAKE LINING

outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.

DEALERS and REPAIRMEN—
Write for data and prices on brake lining, clutch facings, Ford Transmission lining, running board mats and packings.

Manufactured by
MIKESSELL BROTHERS COMPANY
156 No. La Salle St., Chicago, Illinois
Plant and Works, Wabash, Indiana



WE are running this picture with appropriate text in consumer publications of national circulation in order to impress upon millions of readers the absolute necessity of maintaining adequate and evenly balanced air pressure in their tires.

You can do your part in this campaign of education by telling your customers what YOU know about the costliness of under-inflation.

This will not only net you a profit on the sale of SCHRADER UNIVERSAL TIRE PRESSURE GAUGES, but will gain for you the good will of your customers.

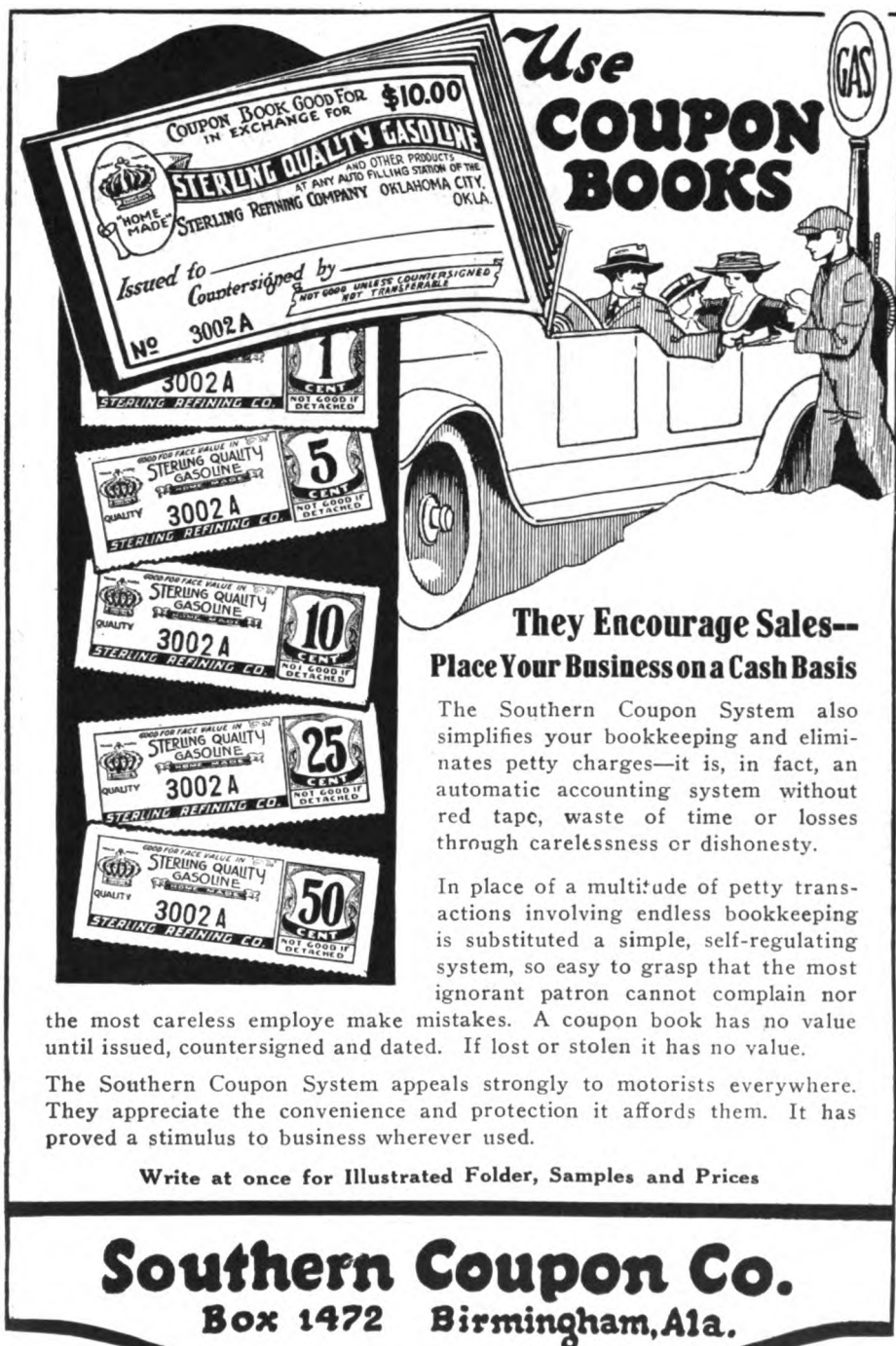
A. SCHRADER'S SON, Inc.

Brooklyn, N. Y.

Chicago

Toronto

London



Use COUPON BOOKS

They Encourage Sales-- Place Your Business on a Cash Basis

The Southern Coupon System also simplifies your bookkeeping and eliminates petty charges—it is, in fact, an automatic accounting system without red tape, waste of time or losses through carelessness or dishonesty.

In place of a multitude of petty transactions involving endless bookkeeping is substituted a simple, self-regulating system, so easy to grasp that the most ignorant patron cannot complain nor the most careless employe make mistakes. A coupon book has no value until issued, countersigned and dated. If lost or stolen it has no value.

The Southern Coupon System appeals strongly to motorists everywhere. They appreciate the convenience and protection it affords them. It has proved a stimulus to business wherever used.

Write at once for Illustrated Folder, Samples and Prices

Southern Coupon Co.
Box 1472 Birmingham, Ala.

grams in the same relative positions that they occupy in the machines themselves. There are more than 300 such layouts in the complete handbook.

The Automotive Publishing Co. of 440 So. Dearborn Street, Chicago, maker of Wells' Auto-Electricians' Handbook, is sending out some interesting information together with sample pages showing many of the valuable features.

Trindl Plant the Culmination of Five Years of Rapid Growth.

A most convincing proof of commercial growth and success is offered in the imposing building at 2917-21 Wabash Ave., Chicago, which houses the busy plant of the Trindl Co., manufacturers of automotive products.

This splendidly-equipped plant is representative of the sort of business expansion that indicates solid and substantial achievement, rather than mere broadening out along uncertain and speculative lines—it is a development of legitimate and permanent character, and is the culmination of five years' rapid growth. It means simply a progressive policy on the part of prosperous houses, designed to meet the increasing demands of their trade.

Starting, five years ago, on a modest scale, the Trindl Co. has experienced an exceptionally rapid and substantial growth, forging steadily ahead until it has become one of the most successful concerns of its kind in this part of the country, and today is not only doing work for many of the largest concerns in Chicago requiring grinding and other machine work under contract, but is also turning out an immense number of automobile parts, for the leading automobile manufacturers, jobbers and dealers all over the country.

The officers of the company are: J. H. Trindl, president; F. A. Trindl, vice-president; J. C. Trindl, treasurer; R. A. Pearce, secretary.

In response to a question regarding business prospects for 1922, it was President Trindl's observation that we would not see any radical and immediate business improvement, but that such improvement as would be noted would obviously be slow and steady.

Included in the activities of this company are: The manufacture of piston pins, pistons, piston rings, flywheel gears, and similar automotive parts, a large service department for regrinding cylinders and crank-shafts, scored cylinder repairing, etc., as well as the manufacture of automobile parts and other machines under contract.

The Trindl Co. has built up an enviable reputation in the automotive world because of the prompt and satisfactory service, efficient and honorable methods, and the maintenance of high standards in materials and workmanship. Quality has never been sacrificed for speed in work

ammeter and voltmeter are attached for making performance tests.

Field Terminals: Points between which various field windings may be tested.

Regulation: Location of output adjustments and methods of changing the charge rate.

Cut-Out: Closing and opening speeds, voltages, and amperages; methods of adjusting both gaps and spring tension.

Starter: Construction of motor and in most cases the cranking performance in speed, torque, amperage, and voltage.

Make and model of generator, motor, motor-generator or ignition unit; also which side of the battery is grounded.

It has been found that the uniform treatment and arrangement of data for all types

of equipment allows the workman to quickly come to use the handbook more as a familiar tool than as a book. The loose-leaf construction of the volume, together with a unique method of numbering the sheets, allows for an indefinite future expansion without changing the original arrangement.

One of the features that appeals most strongly to the working electrician is found in the blueprint diagrams of internal connections and circuits of generators, cut-outs, regulators, and motors; all of these having been drawn for shop work purposes. The field magnet cores and coils, the brushes, the terminals, and the parts of the control units have been placed in these dia-

turned out by the Trindl shops, in spite of their record for prompt service.

"Trindl" quality piston pins represent the crystallization of years of experience and scientific research work.

"Trindl" service does not end with making prompt shipment. It consists of real co-operation. Electrotypes for catalog purposes are furnished upon request. Stock lists and letter inserts are shipped in any quantity properly imprinted with the distributor's name and address. All this is done free of charge.

Scientific production methods, together with a live and up-to-date organization have made it possible to sell "Trindl quality pins" at the lowest possible price. Complete specifications and stock-lists are furnished upon request. Attractive discounts are quoted to jobbers, distributors, etc., and a request addressed to the Trindl Co., 2917 S. Wabash Ave., Chicago, will bring you full particulars.

New Life for Old Springs with Sterling Spring Leaf Oilers.

Spring leaves are made to slide over one another and thus take up the shock. If the surface of the leaves is not lubricated, they grow rusty and squeaky and eventually become like a solid bar of iron. Every jolt is communicated to the rider and engine, instead of being taken up by the springs.

To pry the leaves apart, one by one, and

insert oil or grease—which is squeezed out again when the wedges are removed—is a dirty and unsatisfactory method, as well as being short-lived in effect. Metal strips filled with lubricant are sometimes placed between the spring leaves, but this is an expensive method. If the spring is neglected altogether, as is frequently the case, breakage is sure to result sooner or later.

An economical and effective way to solve the problem is offered in the Sterling spring leaf lubricators. Sterling spring leaf oilers are automatic in action and are self adjustable. They are easily attached to the springs of any passenger car or light truck, no bolts or tools being required for the work.

The automatic action is based upon the scientific principle of capillary attraction. The sliding leaves of the spring act like the fibres in a wick and draw the oil up or down in the same manner as a wick. The thin film of oil which is constantly being spread between the leaves supplies just the right kind of lubrication, it is said, and just when and where it is needed. When the car stops, the feeding of the oil stops also.

Each oiler consists of one circular metal cover, containing felt or absorbent material; one grooved, oblong back plate and two small coil springs. The cover, which is provided with a deep projecting recess or reservoir, is applied to the nearer side of the spring, so that the absorbent material

presses against the edges of the leaves, with the metal back plate directly opposite on the other side of the spring.

The two small coil springs, one above and one below the automobile spring, hook into the eyes of the cover and back plate, holding the oiler in position. The oil springs will extend sufficiently to accommodate almost any automobile spring except that of a heavy truck. The oiler, thus held in position by the tension of the coil springs, will not slip down the automobile spring but will stick where it is attached.

The Sterling oiler, being small and round and possessing no sharp corners, is not unsightly and does not interfere with the washing of the car.

Full particulars may be obtained by writing the Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, Ohio.

Paragraphs.

REYNOLDS SPRING CO., Jackson, Mich., announces that its board of directors has declared a quarterly dividend of 1% per cent on its preferred "A" stock, which was paid December 31, 1921, to stockholders of record at the close of business on December 22, 1921.

NEW ERA SPRING & SPECIALTY CO., Grand Rapids, Mich., at a recent annual sales conference, appointed C. A. "Bob" Engelman to assist sales manager L. M. Bradley and President Smalley Daniels in putting into effect the sales policies of the company.

REPAIR SHOPS

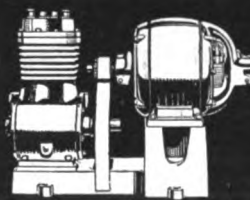
\$50 Starts You in the Business of Repairing Scored Cylinders and Cracked Water Jackets.

Start in this highly profitable business now by using the Bull Dog patented process and tool equipment for repairing scored cylinders and cracked water jackets without preheating or welding and make from \$8.00 to \$10.00 per hour. Write for our special proposition "D".

METALS REPAIR & SUPPLY CO., Inc.
1525 Fourteenth Street, N. W. Washington, D. C.

BRUNNER

**AIR
COMPRESSORS**



Serve 60% of the car dealers
and owners of North America

BRUNNER MFG. CO. UTICA, N.Y.

Sales Offices: Utica, N.Y., Cincinnati, O., Kansas City, Mo., San Francisco, Calif.

J. NEWTON BODDY

*Auditor, Accountant, Systematizer
Specialist in Automotive Accounting*

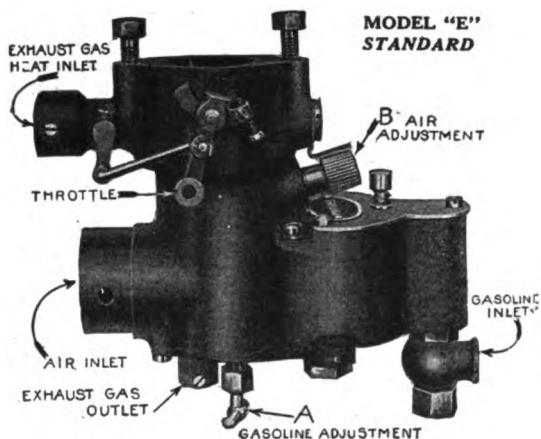
**Audits, Investigations, Surveys, Systems
Income Tax Reports**

**Monthly Balance Sheets and
Operating Statements Prepared.
Unit and Process Costs Established.**

**322 South Fourth Street
Phone Atlantic 1810
Minneapolis, Minn.**

**Cash Journals, Sales Journals, Ledger Leaves,
Purchase Journals, Car Records, Truck Records,
Storage Tags, Shop Cards, Duplicate Statements,
Special Forms, Purchase Orders, Invoices,
Sales Books, Blank Books, Loose Leaf Binders.**

*We Specialize in Systems for Automotive
Dealers*



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

ECONOMICAL—

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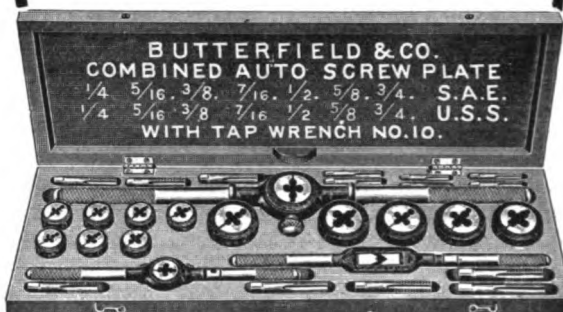
MARVEL CARBURETER CO.

FLINT, MICHIGAN, U. S. A.

BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



Set shown in illustration enjoys a well deserved popularity in the automotive field.

Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each.

Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

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BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

62 Reade Street

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You Don't Guess the Answer

**You READ It
on the Blade**

Cylinder measurements
guaranteed accurate to
within .00025" and less.

**The AM-PE-CO
Direct Reading
Cylinder Gauge**

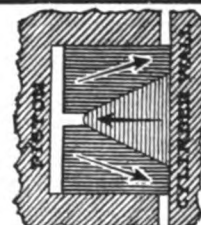
You simply find the blade that fits
the cylinder and *instantly* read
the correct measurement.

Get the whole story in our circular.

PRICE \$2.50

AM-PE-CO SALES CO.
Marshalltown, Iowa

V-Plex Piston Rings



A Few Agencies Still Open

REPUTABLE mechanics know
the value of side expanding
rings. This statement is proven
by our large business with re-
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Over 90% of sales
are repeat orders.

V-Plex rings embody many
other special features of particu-

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them to you?

Exclusive county and sectional
representatives for this remark-
able, self-adjusting-to-wear-in-
all-directions ring are being
appointed. Possibly the agency
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been assigned. Find out. Write
now.

KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL.

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Auto Repair Creeper
METAL CONSTRUCTION

Angle Frame—Spring Fabric—Anchoring Device—Easy
Rolling Casters. Insuring a longer, more economical and
efficient service than any creeper built.

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\$5.00

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furnish efficient protection for cars in dead storage.
They are made of strong, heavy paper, properly
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Made only by

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The Tool You Have Been Looking For

The No. 1 Hot Baby Torch—a four in-one unit oxy-
acetylene welding, cutting, lead-burning and decarbon-
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Costs no more than a lead-burning torch alone.

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Dept. A

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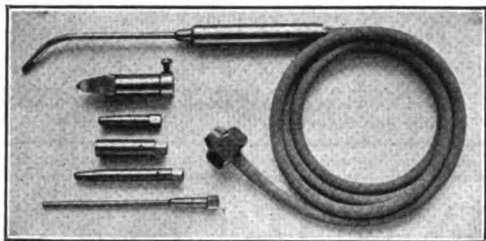
THIS HANDY TORCH

for the garage and repair shop will earn money for you.

Torit Acetylene Torch No. 13

operates with acetylene ONLY. Tips are so designed that they syphon or suck in air to assist combustion. It has no equal for soldering, light brazing, heating, tempering and especially for

RADIATOR WORK



Torit Acetylene Torch No. 13

is furnished with 4 tips for different kinds of work, 1 soldering copper, tubing and connection for auto acetylene tank.

PRICE.....\$7.50

It Gives You a Splendid Opportunity to Put One of Your Old Acetylene Tanks to Good Use

One of the features of this HANDY LITTLE OUTFIT is the long tip for working down into radiators. Another is the soldering copper. SHOULD be in every garage and repair shop.

ORDER ONE TODAY

from your jobber or send direct to the manufacturer.

ST. PAUL WELDING & MFG. CO.

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ST. PAUL, MINN.

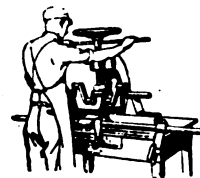
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SHOP EQUIPMENT

The Continental Line

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Designed for all kinds of straightening work, from factory requirements to garage and service station work. The dial indicator shows you to one-thousandth of an inch. It's a member of the Continental equipment family.

Write for catalogue of complete line.

The Best Garages use Continental Equipment



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MANUFACTURERS OF
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(LUBRICATORS, PUMPERS, ETC.)

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AIR and WATER STATION

"Pays You a Perpetual Profit"

Because it continually brings you new customers. Its attractiveness catches the eye of the approaching motorist and its evident cleanliness and efficiency induces them to stop when in need of air and water. And where they stop for convenience they go to buy.

Built in five styles for all requirements.

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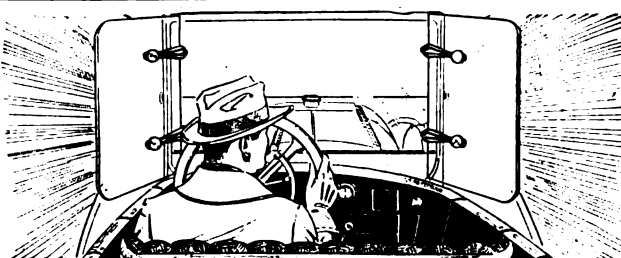
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Model S-B



Model S-D



STAR GLASS WINDSHIELD WINGS

Clear, Amber and Green Glass—No Holes in Glass

Successfully on the market over two years.

Write for particulars

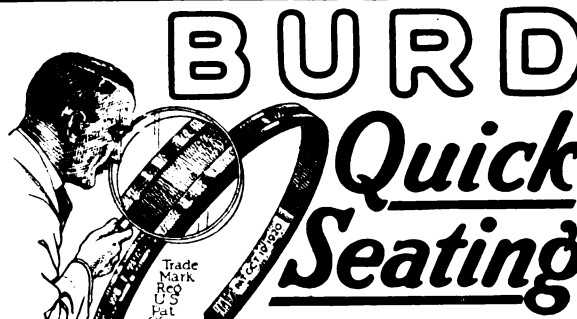
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Buy NOW!

Waiting for lower prices before ordering that equipment you need or stocking these accessories your customers want is like sitting on a fence and waiting for your rich uncle to die. You lose more than you can possibly gain by a drop in prices.

To make 1922 your best year buy your requirements NOW.

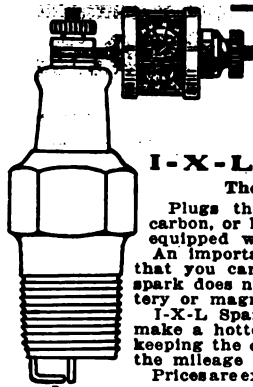
AMERICAN GARAGE & AUTO DEALER



PISTON RINGS

For Quick and Sure Results

BURD HIGH COMPRESSION RING CO., Rockford, Illinois



First Aid to Motor Ignition

When spark plugs are worn out or the insulation is broken there is still a lot of good service in them if equipped with

I-X-L Spark Plug Intensifiers

They overcome spark plug troubles

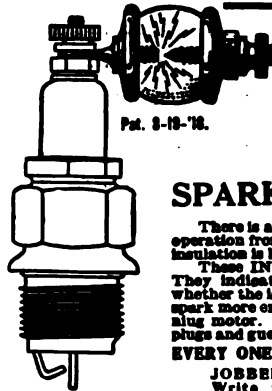
Plugs that have become fouled with grease or carbon, or have broken porcelain fire perfectly when equipped with them.

An important advantage of the I-X-L Intensifier is that you can see the spark from any angle. If the spark does not show the motorist knows that the battery or magneto is not delivering the proper current. I-X-L Spark Plug Intensifiers are adjustable—they make a hotter explosion, increasing engine power and keeping the cylinders free from carbon. They increase the mileage on every gallon of gasoline used.

Prices are extremely moderate. Dealer profits are liberal.

Write today for full particulars.

UNIVERSAL MFG. & SALES CO.
550 W. Harrison St. Chicago



Pat. 1-18-18.

Spark Plug Troubles Are Rare Occurrences

on the car equipped with

UNIVERSAL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon.

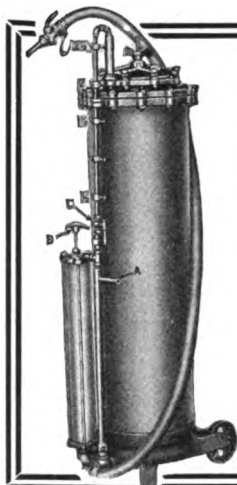
These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is misfiring and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon waste of gas, cleaning the plugs and guessing which cylinder is misfiring.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

JOBBER and DEALER—Your profit is liberal.

Write today for our attractive proposition

UNIVERSAL MFG. & SALES CO.
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The Boe Double Action Grease Pump

Operates by forced air pressure or by hand or by a combination of both.

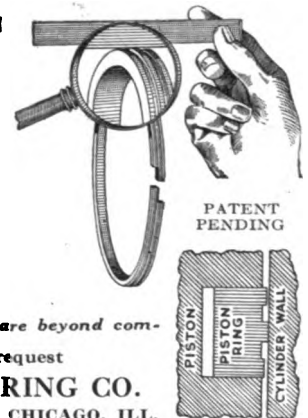
Accurate as a scale. Adjustable "visible" measuring. Indicator "B" travels nearly 8 inches for 1 lb. or pt. Can be set to dispense any exact quantity desired.

Will handle 30 pounds of silent gear grease in one minute.

Ask about our 15 other pump outfits.
Biggest line of its kind.

BOE MANUFACTURING CO.
MINNEAPOLIS, MINN.

INSTANSEAT seat instantly PISTON RINGS



Dealers say—"It pays to handle INSTANSEAT rings because:

Customers desire quick results—

Preventing passage of excess oil guarantees against come-back jobs—

Individual virgin grey iron castings insure good results after long usage—

and because

Quality, prices, and discounts are beyond comparison.

Sample ring mailed on request

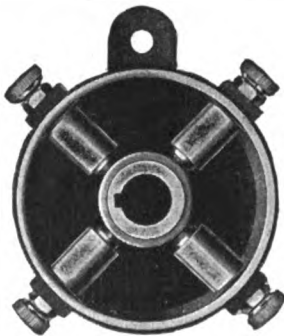
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TIMER FOR FORD CARS



The timer with the written guarantee that insures the buyer perfect timer service for two years and at 50 cents per year thereafter. Write our sales dept. today for full details.

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The GARDNER is an air compressor that has over 60 years of reputation behind it. For complete information see our full page ads or send for illustrated circular in colors.

C. A. DICKERSON

614 Fisher Bldg.

Chicago, Illinois

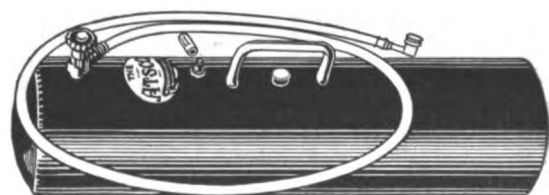
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You can "cash in big" by replacing Ford radiators that have been cracked and bursted through freezing with JAFFE RADIATORS.

The JAFFE \$100.00 Reward Guarantee has a wonderful appeal for your customers. It is the greatest selling feature ever offered the trade. It means big JAFFE sales for you.

Write for our Yellow Book and proposition
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You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

Pittsburgh, Pa.





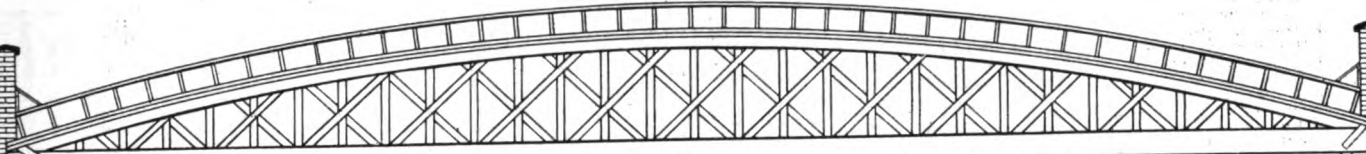
Mends punctures and blow-outs

TO STAY MENDED.

This is the original, the genuine, no heat, no cement, no gasoline inner tube repair. Patents, fully covering process, pending.

Notice—Dealers who are interested in securing the most profitable and aggressive sales co-operation ever offered on an automobile product will please write direct to manufacturers.

ROBERT M. BOWES CO., INDIANAPOLIS



DOUBLE LATTICE TRUSS

Guaranteed to Carry Any Snow Load

For the new garage, or the old one that is being remodeled, this makes the strongest and sightliest construction. Adaptable to spans up to 125 feet—eliminates all posts. Constructed right on the ground where the building is going up. *Write for complete information.*

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World's Standard for Speed Accuracy and Reliability

Made in All Sizes from Small Hand Tools to Large Vertical Boring, Burnishing and Milling Machines.

Capacities to Meet Your Requirements.

Write Today for Complete Catalog Covering Storm Equipment

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SOLDERING SALTS

for soldering all metals—just dissolve in water and the flux is ready. Harmless, quick-acting—just the thing for automobile repairs.

Buy it from your jobber in ½ lb., 1 lb., and 5 lb. cans.

New Prices for 1922.

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APPLICATION OF EXTENSION ARMS

REMOVING AUTOMOBILE WHEEL

"LITTLE GIANT" GEAR AND WHEEL PULLER

Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. **THE HARDER THE PULL—THE TIGHTER THE GRIP.** Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

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HEAVY DUTY GREASE PUMP

makes the handling of grease

SWIFT — CLEAN — EASY — SURE

One man greases any differential or transmission in two or three minutes.

No grease is spilled on car, floor, hands or clothes. Delivers ¼ pound per stroke. Indicator shows amount used.

Sold on money back guarantee.

McParo Co.

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That is what an auto repair man said the first time he installed a set of B-N Piston Pins. And he had good reason to. All six pins fit the reamed pistons perfectly without any change of reamer. They slipped to seat as though ground for that one job. The thing that pleased this man was the fact that his B-N Pins cost him nearly a third less than the factory would charge and he got the

B-N Piston Pins

of these jobbers or factory branches—

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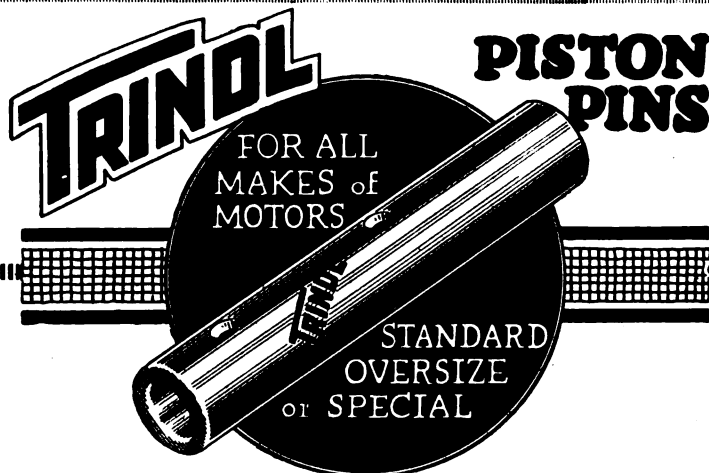
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If you haven't our specification chart and discount sheet—ask for them.



JOBBER — DEALERS!

Are you prepared to supply the demand for Trindl Piston Pins?

Trindl Piston Pins are the best pins you can buy. They are special heat treated which gives them a hard surface of about 1/32" in depth—accurately ground and tested to 1/10 of 1/1000th of an inch.

We carry an enormous stock of piston pins for all makes of motors, standard and oversize for immediate shipment. Specials on 24-hour notice. Quality, price and service makes us your most logical source of supply.

Send for Our Piston Pin Specifications and Price List.

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LOWEST PRICES for Good Serviceable **PARTS**

We are the biggest wreckers in the world. The size of our business enables us to undersell all competition.

Money cheerfully refunded if you are not satisfied.

We make a specialty of our service to the trade and can supply you with practically any parts you want from stock. Orders shipped the day received.

Our stock includes motors, Bosch magnets, coils, magneto parts, rear axles complete with wheels, differentials, tires, rims, and all other parts.

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Largest Car Wreckers in the World

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Box Number 5, care of the American Garage and Auto Dealer.

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**FOR FORD CARS
and FORD TRUCKS**

"PRO-TEX-OIL" is a high grade, natural, rich automobile oil, refined from Pennsylvania Crude, manufactured and compounded in such a way as to permit it to retain a larger percentage of lubricating fat than through the ordinary refining process. Through the process in which we manufacture this oil, it retains its natural lubricating fat which greatly improves the lubricating qualities and accomplishes its most important object which is THE ABSOLUTE ELIMINATION OF CHATTERING in Ford cars and Ford trucks.

It is a known fact that by not stopping this chattering when you have the means of doing so (using our "PRO-TEX-OIL") you are absolutely shaking your Ford car into the repair shop and this means a big additional expense.

By eliminating the chattering you eliminate the loose bolts and nuts in all parts of the Ford car or truck. Practically all transmission troubles and rear axle troubles are caused by this unnecessary chattering.

"PRO-TEX-OIL" eliminates the changing of brake-bands to stop the chattering. The result is that PRO-TEX-OIL will give more mileage on oil and gasoline, more power, no excess carbon, and the absolute elimination of the

annoying succession of jerks and jars you get every time you brake down your car or reverse it.

A Ford car or truck is usually selected from the standpoint of economy and it really lives up to its reputation in this respect. Automobile Oil is practically the most important part of your car, therefore, our "PRO-TEX-OIL" is the most important and should have first consideration.

"PRO-TEX-OIL" IS THE GREATEST SHOCK ABSORBER OF THEM ALL—absolutely no annoyance from bumps and shocks when applying the brakes if you use our "PRO-TEX-OIL" for your Ford cars or trucks.

OUR GUARANTEE

"PRO-TEX-OIL" is guaranteed to immediately stop the chattering in the brake-bands, to increase the power and leave no excess carbon residue. By that we mean the carbon residue from PRO-TEX-OIL is less than that from other oils as "PRO-TEX-OIL" is refined from Pennsylvania Crude.

"PRO-TEX-OIL" is the greatest achievement in Ford automobile lubrication.

Dealers and Jobbers Wanted: Territory going fast; write or telegraph for territory.

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Guaranteed Repairs and Replacements—Any Make or Type Magneto--Generator--Starter DISTRIBUTORS—JOBBER

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SAMPSON ELECTRIC COMPANY

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Auto Parts Designed, Made and Repaired

Also Specialize on the Designing and Making of Mechanical and Electrical Tools, Fixtures, Dies, Jigs and Stampings. Experimental work.

Splendid facilities for giving "prompt service" to Garages, Repair Shops and Service Stations. Correspondence and Inquiries Invited.

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If you SELL AUTOMOBILES you can SELL LIFE INSURANCE

Some of our agents cleared above \$10,000 last year. Best territory open. Very liberal contracts. Popular policies. The Farmers National Life has \$1.75 of admitted assets for each dollar of policy liability. Write at once to

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Are you for success in this industry of unlimited opportunities. Learn the automobile, truck and tractor business. GREER master methods will make you a trained man—able to earn big money. Our courses cover every branch of the automotive industry. Tuition is moderate.

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Standard and Overseas

PISTONS

PISTON RINGS PISTON PINS
ALL WORK INSPECTED

With our **BU-NITE PISTONS**

Goes a **GUARANTEE**
of **SATISFACTION**

Standardized Prices
Material and Workmanship Guaranteed
Modern Equipment
Skilled Mechanics

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Established 1897 INDIANAPOLIS, IND.

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Mikesell Bros. Co., 156 N. La Salle St., Chicago.

COUPON BOOKS

Southern Coupon Co., Box 1472, Birmingham, Ala.

COVERS

Kennedy Car Liner & Bag Co., Shelbyville, Ind.

CRANES

Curt's Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

CREEPERS (For Repair Shops)

Foster Bros. Mfg. Co., Utica, N. Y.

CYLINDER REMOVING AND EQUIPMENT

Butler Mfg. Co., Indianapolis, Ind.
Dearborn Equipment & Hinckley-Myers Co., 40 No. Michigan Ave., Chicago.
Storm Mfg. Co., Minneapolis, Minn.
Trindl Co., 2917 So. Wabash Ave., Chicago.

CYLINDER REGROUNDING

Burgess-Norton Mfg. Co., Geneva, Ill.
Trindl Co., 2917 S. Wabash Ave., Chicago.

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Am-p4-co Sales Co., Marshalltown, Iowa.

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Sampson Electric Co., 2384 So. Wabash Ave., Chicago.

ENGINE STANDS

Continental Auto Parts Co., Columbus, Indiana

FIRE FIGHTING EQUIPMENT

Flexlume Sign Co., Niagara St., Buffalo, N. Y.

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Dearborn Equipment & Hinckley-Myers Co., 40 No. Michigan Ave., Chicago.
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H. G. Paro Co., 1410 So. Michigan Ave., Chicago.
Marvel Machinery Co., Minneapolis, Minn.
Metals Repair & Supply Co., 1525 14th St. N. W., Washington, D. C.
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Watervliet Tool Co., Albany, N. Y.
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Premier Electric Co., 2800 Ravenswood Ave., Chicago.

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Frank Rose Mfg. Co., Hastings, Neb.
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Butler Mfg. Co., Indianapolis, Ind.
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Krausberg Piston Ring Co., 526 Lake Shore Drive, Chicago.
Trindl Co., 2917 So. Wabash Ave., Chicago.

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Washburn Burner Corp., Kokomo, Ind.

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Star Wing Co., 170 W. Randolph St., Chicago.

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AUTOMOBILE SPRINGS
MANUFACTURERS AND SPRING SERVICE
GARDEN CITY SPRING WORKS
2300 Archer Ave. Chicago

Make Your Dollar Work Six Times as Hard

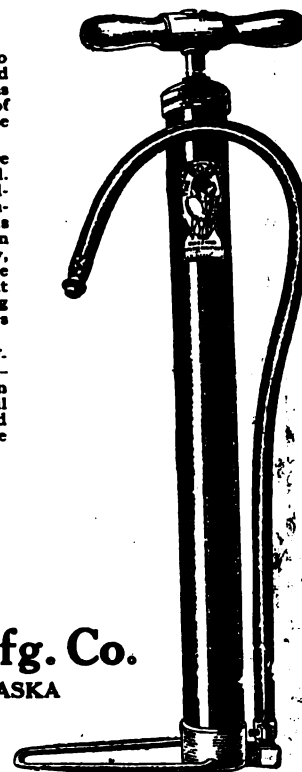
If you handle only one brand of tire pump your turn-over and profit will be six times as great as when you carry equal stocks of six different brands. That's the A-B-C of business.

Nearly every dealer sells more Rose Pumps than any other kind. It is acknowledged as the standard pump. Then why not concentrate on a strong seller? There is no better proposition for you than what Rose offers—a high quality, low priced pump backed by a five years guarantee. The patent valve feature makes pumping quick and easy and always pleases the customer.

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List 1½-inch, \$2.50
1¾-inch, \$3.00

Frank Rose Mfg. Co.
HASTINGS, NEBRASKA



Buffum Buick Valve Remover

Throw away your crowbar and lift those valves easily

with the Buffum Buick Valve Remover—the only tool which will properly remove the Buick valve from assembly. Stop breaking valve cages and bending washers, valve springs and valve seats. With the Buffum tool the job is done quickly, safely and surely. Fits Buick motor of all sizes since 1912. Light, compact and easily handled, yet is strongly built of the best materials.

An Essential Tool

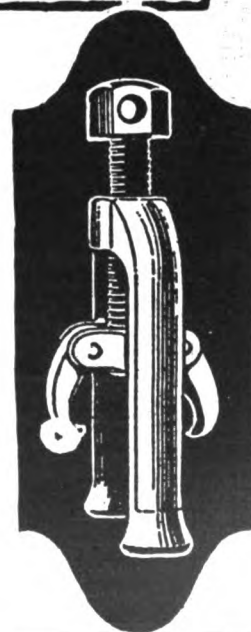
Buick valves must be cleaned from time to time. When they become fouled with carbon they do not seat properly and there is a noticeable loss of compression and power. With clean valves the motor runs smoothly and maximum power is possible. It pays to use the Buffum Buick Valve Remover when you have Buick valves to clean.

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Company

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(Walter A. Zelnicker Supply Co.)

ST. LOUIS

(Wellston District)

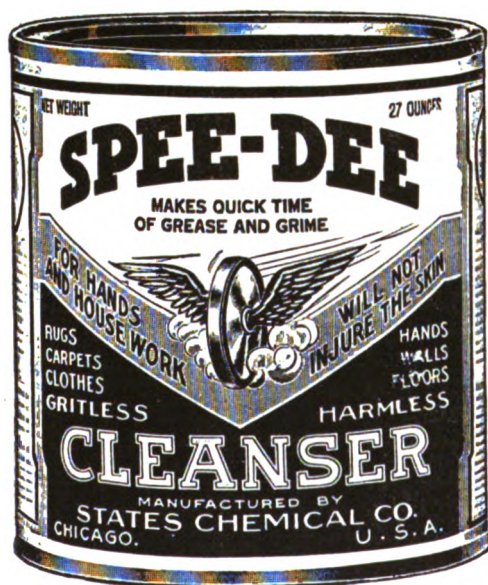
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American Garage & Auto Dealer

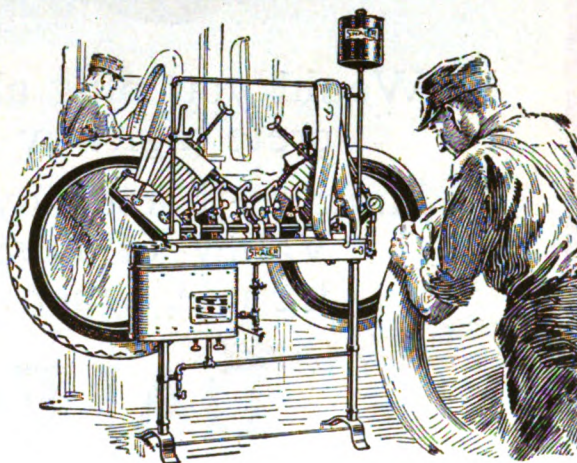
Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

FEBRUARY, 1922

Vol. 13—No. 2.
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SHALER Vulcanizers

*Are Used By Over
20,000 Tire Repair Shops*



The Shaler is the Standard Shop Vulcanizer—used by 20,000 garages—all over the world. It has large capacity—about 200 tubes and 20 casings a day—and handles all practical tube and casing repairs.

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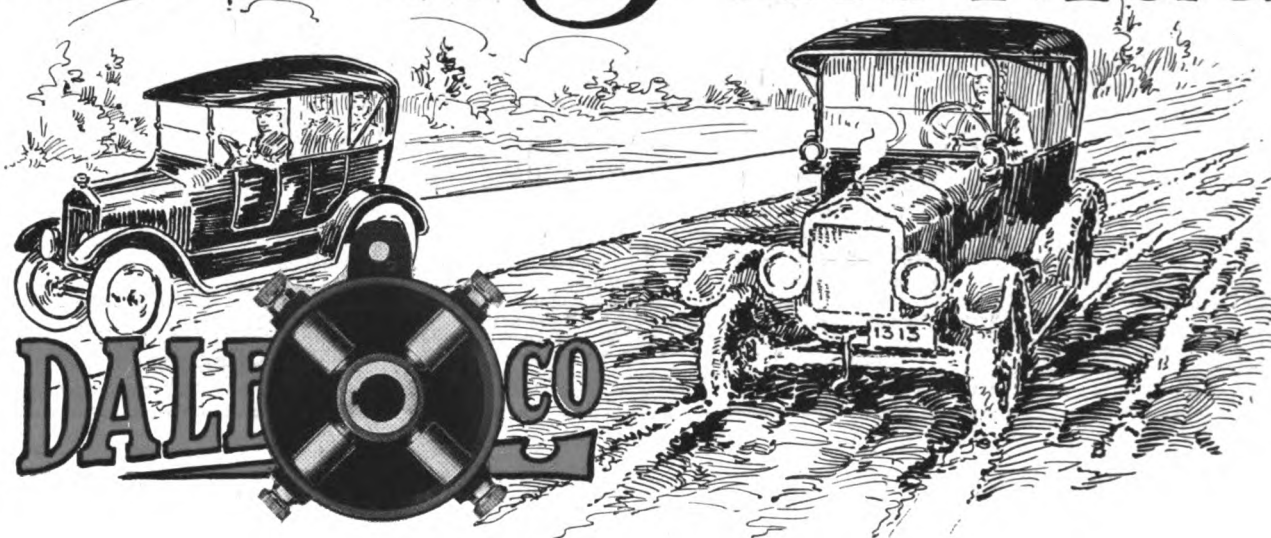
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Sales Department
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Just 5 easy-to-use forms.

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.....192.....
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109 No. Eighth St., St. Louis
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Name.....
Address.....
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CHAMPION AIR SERVICE

will make 1922 a good year for many

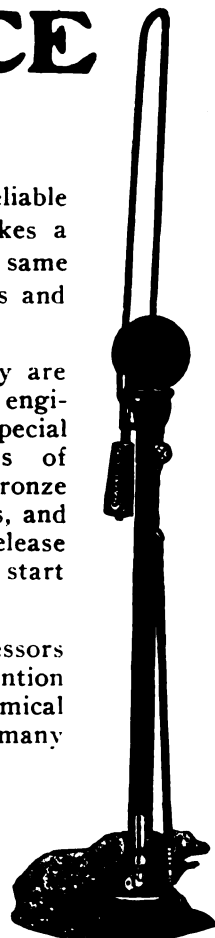
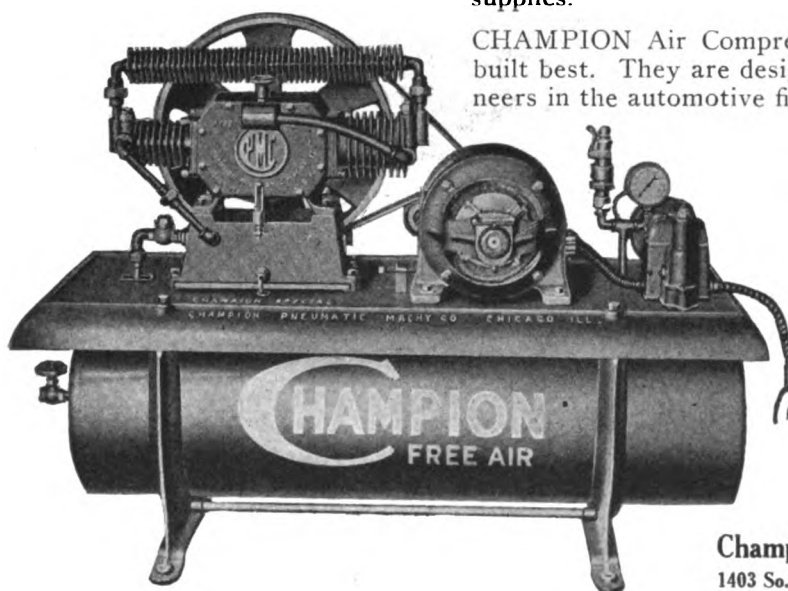
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Every Feature of W & C Shock Absorbers is a mark of superiority

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W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

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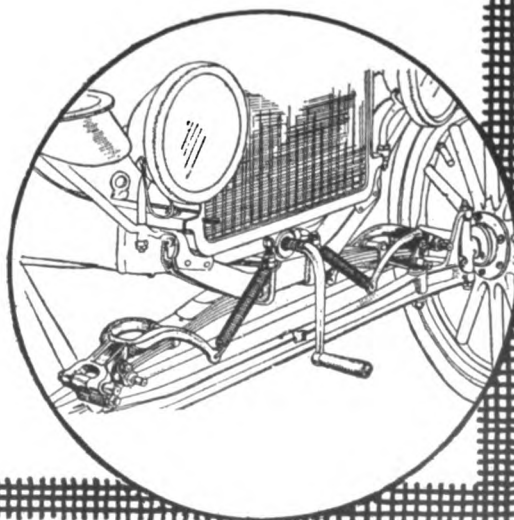
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

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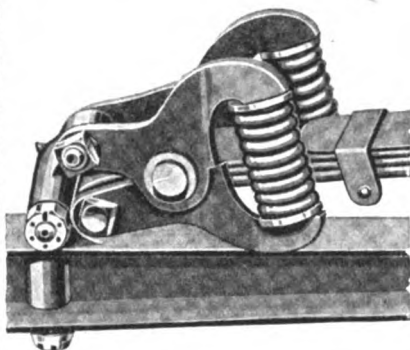


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CHICAGO, ILL.

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You can do your part in this campaign of education by telling your customers what **YOU** know about the costliness of under-inflation.

This will not only net you a profit on the sale of SCHRADER UNIVERSAL TIRE PRESSURE GAUGES, but will gain for you the good will of your customers.

A. SCHRADER'S SON, Inc.

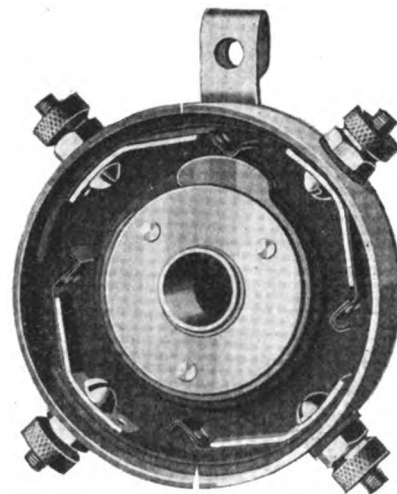
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THE LEICH MAGNETIC TIMER



For Fords and Fordsons

Designed by engineers of long experience on automotive ignition the Leich Magnetic Timer eliminates the disadvantages of other types and has some new features of its own.

No spiral springs—no rollers—no fibre raceway—no contact points to clean—no attention needed when once installed—no effects from engine vibration.

The Magnet Does It

Dependable, positive operation plus a long life of service is assured every user of this wonderful Magnetic Timer.

DEALERS—The Leich Magnetic Timer is sold on 30 days' trial. Send in the coupon and get all the data.

LEICH ELECTRIC CO.

Manufacturers of RADD Spark Plugs

GENOA,

ILLINOIS

LEICH ELECTRIC CO.

Genoa, Ill.

Please send me complete information and prices on the Leich Magnetic Timer.

NAME

ADDRESS

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, *Editor*

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AMERICAN GARAGE & AUTO DEALER, Inc.

116 South Michigan Avenue, CHICAGO

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For thirty years, without intermission, Wayne's inventive minds, skilled, fashioning hands, supervisors and executives have worked by day and by night, to keep apace with the ever-increasing demand for Wayne Honest Measure Gasoline Pumps.

Full time, full force is our daily schedule.

This condition, unusual in this industry, we attribute to the justly earned good will of the world's most prudent gasoline pump buyers. In substance, leadership gained as a reward for superior quality and better service.

Back of this superior quality, greater accuracy, quicker delivery, dependability and safety of each Wayne Honest Measure Gasoline Pump is the accumulative result of thirty years' exhaustive experimental and actual-test work. These pumps are the fruits of painstaking yesterdays.

The deep-seated satisfaction which you feel, the certainty of performance, the accuracy, economy and the service you enjoy through long years of use all flow out of the experience gained in the development of these pumps.

When better pumps are made to measure gasoline, Wayne will make them.

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*A National Organization With Sales Offices in
Thirty-Four American Cities*

REG. U. S.
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TRADE MARK

OIL CONSERVATION SYSTEMS

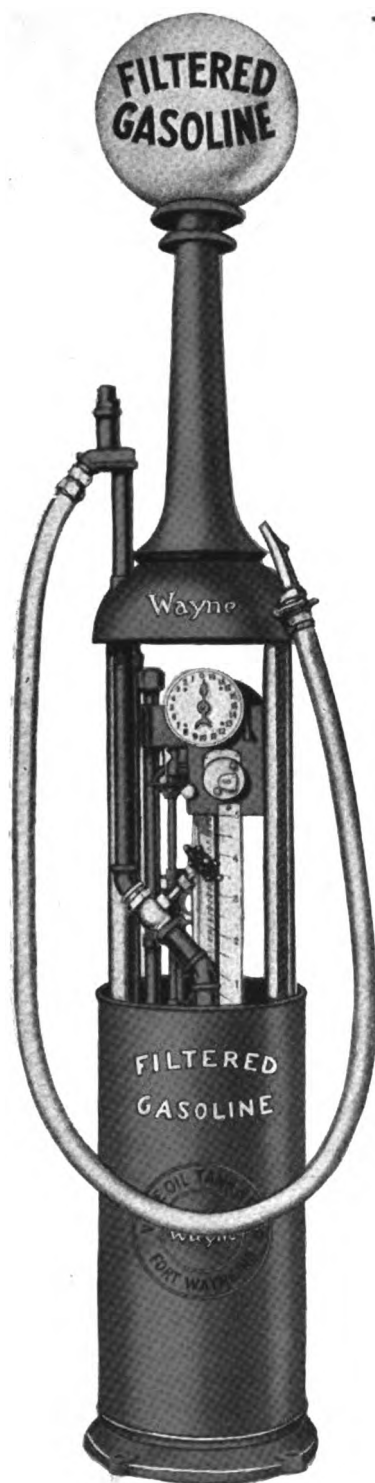
Gasoline and Oil
Storage Systems

Heavy Metal
Storage Tanks

Oil Filtration
Systems

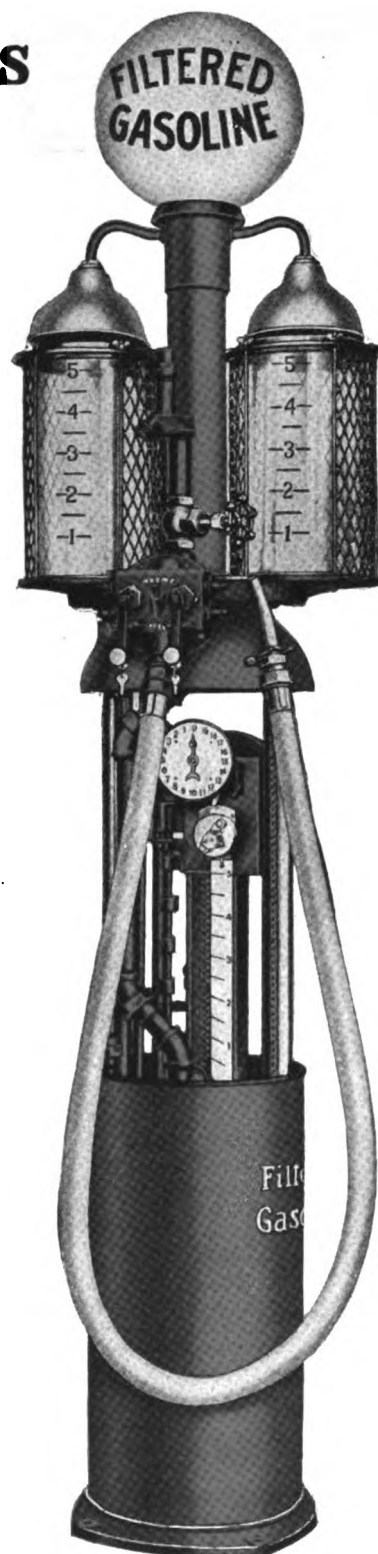
Oil Burning
Systems

Furnaces for Metal Melting
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The Wayne Monarch
CUT 276

The fastest five-gallon pump. It operates easily by hand. Sturdy, dependable, and mechanically accurate. Preferred by motorists because of its many exclusive features. Bulletin 276-AGD describes it in detail.



The Super-Visible
CUT 452

Really two pumps in one. Operates as a visible or piston-type pump. Has all the exclusive features of the Monarch plus two glass containers. Bulletin 452-AGD describes this safe, mechanically accurate visible pump.

PRECISION PRODUCTS

POPULAR-PERMANENT-PROFITABLE

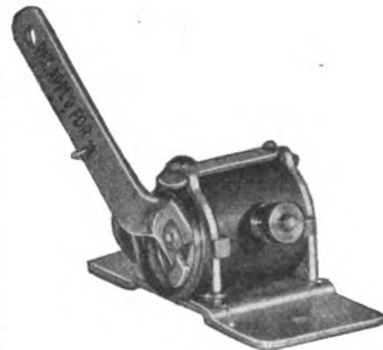


PRECISION REAR TRAFFIC SIGNAL

**Tested and Approved by the
Underwriters' Laboratories**

The important element of the rear traffic signal or automatic stop light is the switch, as on that depends the operation of the light and if the switch fails to work, you are without a signal and in more danger than as tho you never had one.

The Precision Switch has not only passed searching tests of the Underwriters' Laboratories, but in public demonstration, entirely submerged in water and carrying current for a 60 Watt lamp, has withstood over a million operations with no sign of failure or deterioration and is still working.



It is the only switch with bearings at both ends of the shaft, which allows the use of a spring heavy enough to meet requirements.

The body of the lamp is a one piece drawn shell and the lens is secured by a compression ring that makes the lamp dust and water proof.

There are no outside connections to loosen, get out of order or to be tampered with. It gives a brilliant light, readable at a great distance, day or night, without glare.

Retail price, complete.....\$4.50
West of Rocky Mountains.....\$4.75

PRECISION HED-LITE GLARE DEFLECTOR

**Especially approved in
the following states
and legal everywhere:**

**IOWA
INDIANA
OHIO
NEBRASKA
UTAH
CALIFORNIA
MINNESOTA and the
Electrical Testing Laboratory of New York.**

An all steel Glare Deflector that gives the maximum illumination positively without glare. Quickly and easily installed in any head light and once in place is unbreakable and absolutely nothing to get out of order.

Some Glare Deflectors are absolutely ineffective. Some comply with legal requirements, but so reduce the illumination that they become a danger to the driver of the car.

The Precision Hed-Lite Glare Deflector meets all legal requirements and improves the illumination by deflecting all the light downwardly on the road where you need it. Made of white enameled steel in three sizes to fit all lamps.

**No. 1—8-8 $\frac{3}{4}$ in. lens,
No. 2—8 $\frac{7}{8}$ -9 $\frac{3}{8}$ in. lens,
No. 3—9 $\frac{1}{2}$ -10 $\frac{1}{2}$ in. lens,**

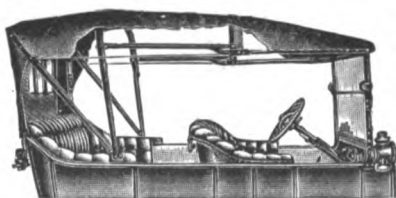
Price, per pair, either size.....\$2.50



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PRECISION TOP CONVERTER for FORD CARS



Turns any Ford top into a perfect working, attractive and convenient one man top. Rejuvenates the old top no matter how sagged it may be, brings a new top up-to-date in construction and eliminates the annoyance of the front bows. Made for both touring cars and roadsters.

Price—Complete for Touring Cars or Roadsters, \$7.50,

PRECISION AUTOMATIC OILER:

An automatic wick feed oiler to take the place of grease cups on king bolts, steering connections and in places where a vertical cup can be used.

Assures perfect lubrication with minimum effort.

Write for Prices.



Write for Special Circulars Covering These Two Items

PRECISION METAL WORKERS

3100-12 Carroll Avenue

Chicago, Illinois.

American Garage & Auto Dealer

*A Business Paper Exclusively for the "Small-Town"
Automotive Trade*

Vol. XIII. No. 2.

CHICAGO

FEBRUARY, 1922

Efficiency Methods Oil the Wheels

Some of the Feats Which Have Been Accomplished in Two Years by a Live Man Who Took Hold of a Dying Business—A Well-Established System of Discipline and Order in Each Department Places Business on High Plane

By L. M. Dowdey

Two years ago Bertrand Bailey, a progressive young man, purchased the business known as "The Palace Garage," of Ottawa, Kansas, a town of about 10,000 people.

Bailey had ideas in regard to the garage business and also had the force and energy to put these ideas into operation. At the time he took charge, he made a wager with the former owner that he would do a \$100,000 business the first year.

A hurried survey of the previous year's books, showed that the business had run only \$40,000, so the retiring garageman readily took the wager. Owing to the general slump in the automobile trade, Bailey did not quite reach his mark, but he did reach \$82,000—more than twice the previous

year's business! This was accomplished by hustling, and by efficiency methods which "bring in the coin."

First and foremost, Bailey has that greatest of all assets to a successful career in any line of endeavor—a genial, whole-souled, inspiring manner, which has the effect of driving away the "grouches" and at once putting one in a happy mood. Consequently, he is popular with all. His old customers remain and new ones come again.

The employees, too, understand that a pleasant, courteous manner is considered a necessary part of their efficiency. Bailey maintains a well-established system of discipline and order in every department. No loafing is allowed, no loud talking and no foul language. This places the business



One-half Garage Space, "Palace Garage," Ottawa, Kans.

on an exceptionally high plane.

When Bailey took charge, the interior of the garage was decidedly inconvenient. A portion separated the building into two distinct parts, with only one driveway from the street into each part, making it necessary to back out. He at once had the partition removed and arranged a row of stalls in its place. Now a car drives, through one entrance, directly into a stall and, in leaving, drives out through the other entrance without backing or turning.

The public likes to be put to the least possible trouble and loss of time. This was proven beyond a doubt by an increased demand for garage space. This necessitated the removal of a rear partition which had been erected to keep the public out of that part of the building. Bailey says he sees no rea-



Large Window at Farther End of Office Shows Doors to Driveway Set Car's Length Inside Building.

son for keeping the public out of any part of the establishment. Instead, he is making every effort to bring the public in.

Another real convenience was gained by placing the doors of the driveways a car's length inside of the building. This brings the car under shelter and off the curbing while waiting for the doors to be opened. These driveways are on each side of the office, with glass partitions between, and the doors are operated from the office by ropes and pulleys, thus causing practically no loss of time for patrons or employees.

This plant is operated on the plan that "Time lost is money lost" and every practical efficiency device is employed which will utilize the time to the best advantage. Space, also, is made to yield the greatest possible returns.

When Bailey, like all other dealers, found that retrenchments must be made in order to cut overhead expenses, he decided upon several changes.

One small space had been renting for \$50 per month. He found that, at the end of one year, it had yielded the renter enough to buy himself a car and take his family to California.



Geniality and "Pep" of Bertrand Bailey With Detailed Systematic Planning and Determination to Execute Plans Make "Palace Garage" Synonymous With "Efficiency."

When this lease expired, Bailey selected his best workman and put him in charge, on a commission basis. At the end of the first month it netted Bailey \$131, an increase of \$81 over the previous contract. With the present plan, the amount varies each month.

He partitioned off a small room in each front corner of the building. The rent from these two spaces is nearly \$100 per month. This gives over \$200 in sub-rents and leaves ample space for the conduct of his business.

Another especially profitable plan has been the renting of cars to be driven by the renter. A year ago, instead of using time and gasoline demonstrating two new cars, Bailey decided to rent them—the renter furnishing his own gasoline and oil.

This method, while not the only one used for selling cars, has been the means of selling several, besides netting him the neat sum of \$1,500 in rent—and he still has the cars.

Last summer he offered for sale a small used car for \$250. The sale was slow and he rented it on the same plan. The car has made, in rents, the \$250, and is still a good car.

Bailey says that his success in building up the business, and subsequently holding his own during slack seasons, is due to his fixed purpose of giving the public the best possible service. In other words, he puts into operation such efficiency methods as will "oil the business wheels" and cause the minimum expenditure of time and effort of all who may be concerned.

Push Accessory Sales in Winter

Cold Weather Ideal Time to Sell Accessories—Motorist Has Less Expense on Car and Is More Responsive to Sales Appeal—Prosperity and Profits Lie in Direction of Increased Volume, Quick Turnover and Lower Overhead

By Lester G. Herbert

Has it ever occurred to you that winter is really the ideal time to make automobile accessory sales?

During the motoring season, the expenses of maintenance and touring make a steady demand upon the car-owner's pocket-book. Gasoline, oil inner tubes and necessary repairs are bound to eat up some money, and many a time the motorist passes up a needed tire tool, a new clock for the instrument-board, a rear bumper, or a motormeter which he really wants and needs.

As a matter of fact, business conditions and the high cost of living have hit more people than they have skipped, and there are few indeed who do not have to practice some economy. So it stands to reason that a time of year when the motorist is spending

less than usual upon his car is the very time of all times to present to him the accessories which will appeal.

So here, Mr. Dealer, is your opportunity. Put on a mid-season sale of accessories, ranging from \$1 to \$5. There are a lot of items which can be included in this list, and the very limits of the sale and its offerings will interest and make the motorist say to himself:

"Well, a trouble-light, a new tire gage, and that wrench I have wanted so long will not cost much. I reckon I'll drop into Wideawake's while this sale is on and get them."

Then, a little later, stage a winter or early spring Opportunity Sale, offering accessories at from \$5 to \$12.50. Make as extensive a listing as you can and stress the savings, the con-

venience, and the permanency of the nature of the purchase.

Remember that when you sell a new tail light, or bumper or tire carrier, that you really have to make two sales each time. First, you sell the idea—and that is the hard part. When you have sold the idea of economy, durability, safety, or convenience as the case may be, it is relatively easy to sell the article itself.

Convince the prospect, and then the actual arrangement concerning the goods is vastly simplified. The way is smoothed. If the customer has the money he will not question the purchase. If he hasn't the money at the moment, and is thoroughly sold on the idea, he will not be satisfied until he comes back and makes the actual purchase.

A third sale may be arranged of accessories running from \$12.50 to, say \$37.50, taking in tires, and anything else which falls within this range of prices.

A fourth sale may reach from \$37.50 to \$150, and may include new tops, special wheels, or anything else which you are offering, whether it be goods or the installation of special carrying compartments in the machine.

Call attention in your advertising to the pertinent fact that the money not being spent for gasoline and oil now—for even when a car is used in the winter it is used less—can be invested to good purpose, in part at least, to insure a comfortable season of driving later on.

In some instances, it will be good business policy to sell such accessories on a satisfactory payment down to hold the goods—the balance to be paid when the goods are delivered.

One dealer who followed this plan made it his rule that a third, a quarter, or a half of the purchase price had to be deposited. The amount was

either according to the value of the article or the credit of the individual.

In each case the dealer covered himself so that he could not lose. It was his experience that, once a customer invested his money and made a substantial payment on something which he hoped to possess, he would always come back with the rest and that usually before long. In fact, less than 20 per cent left their purchases to be called for when the driving season opened.

Another dealer, who understood human nature pretty well, prevented a tie-up of his capital by making special price offers on a contract. He agreed to hold the goods for two, three or four months, as might be stated in the brief agreement signed by both.

In short, his plan was to mention a definite date by which time the rest of the payment must be made or the goods automatically went back into stock. These were printed blanks and the customer was given a copy. They did not give offense as they were

courteously worded, and the patrons knew that they were expected to make good by a certain date.

The cold weather season is the best of times to sell automobile rugs, lap robes, primers, heaters, fur gloves, winter tops, and all the other things which go to make for the comfort of the one who drives through cool weather.

Frequently, people who are perfectly able to afford such conveniences do not have them simply because they have not taken the time to go into the merits of the case. If these people receive a personal letter, or a personal call, or you take the matter up with them in a tactful manner when they come into your salesroom, you will have little trouble in securing a considerable amount of profitable business.

These are the days when we must work for increased volume, quick turnover, and lowered overhead expense. By making a definite effort in these three directions, prosperity and profits will not be difficult to win.

Accounting: Leaks in the Garage Business Are Caused Almost Entirely by Lack of Adequate Records—Many Garages Attempt to Operate Without Records Which Are Essential to Accuracy and Economy — Suggested Schedule Which Will Give Important Statistics of Shop Operation

By J. Newton Boddy, C. P. A. (N. A.)

Auditor, Accountant, Systematizer, Specialist in Automobile Accounting

Leaks in the garage business are caused almost entirely by lack of adequate records. Many garages are operated without sales slips, purchase orders, stock requisitions, job orders, workmen's daily time cards, storage tags, and sometimes with no more bookkeeping system than the old-fashioned single entry. Many garages lack some of these forms, few garages have all of them, and some garages "will have none of them anyway."

Any one of the items mentioned will save its cost in a season. In the average garage, \$1,000 can easily leak away in a year and never be missed. In larger shops, the writer knows of instances where the leaks run into thousands of dollars yearly. By leaks, we mean unaccounted for losses. A man may be making a fair profit on his business and still have heavy leaks. This is the hardest man to help, for success sometimes has a tendency to make one careless.

How many men have had occasion

to rebate charges to a good customer because of a dispute regarding time? Why? Because a sales ticket was not made out at the time the work was completed and delivered with the car. How often has a car left your shop and you have later found that you had neglected to charge for some particular part you supplied?

How often do you find yourself un-

able to account for a stock shortage in tires and tubes, or batteries? How often do you have trouble in checking out your gasoline or oil sales? How do you know that "the house" is not buying gasoline and oil, or sundry parts, for the mechanic who drives a car?

The easiest way to stop a leak—and the only way—is to find it first. Any one can stop a leak once it is found. When you have found one, look for another and stop it also. There is not a leak in the garage business that adequate records will not stop. Think it over. If you have a leak which you believe defies fixing, let us hear from you. It is a safe bet that we can suggest the proper repairs.

When the average garage owner comes to realize that the profits are assured in the office, rather than in the shop, then only will he be able to get the maximum profit from his industry and enterprise.

The first requisite of every shop

| EMPLOYEE | | RATE | |
|---------------------|-------|----------------|-----------|
| DAILY TIME CARD 192 | | | |
| TIME | TIME | JOB | WORK DONE |
| | START | NUMBER | |
| 7:00 | | | |
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| 6:30 | | | |
| 6:45 | | | |
| 7:00 | | | |
| TOTAL DIRECT TIME | | TOTAL INDIRECT | |

Each Workman Fills Out Daily Time Card.

form of work order is the one most used.

In some of the larger shops, where the identity of the car is kept from the mechanics, another form of shop order and shop tag is used. In this case there is more clerical work, as the shop tag is made out from the shop order. Detailed instructions and time are registered on the back of the shop tag.

The claim check may be a stub of the customer's copy of the shop order, or the stub of the shop tag. If this system of work order is used, it is always best to make the shop order in duplicate.

The other form in general use is the Ford Miller system shown in the illustration of Sturr-Bullard Motor Co. repair order form. This is a triplicate form—original white, duplicate yellow, and triplicate manila tag. The original is the house copy and is sent to the shop clerk, to be returned to the office and filed when the work is completed.

On the back of this sheet are spaces ruled for the record of material and parts—date, delivered by, quantity, part number, article, sales amount, cost, and guarantee. The duplicate is the customer's copy and contains all information and data on the original. The stub of the customer's copy is a release and must be stamped by the cashier before the car is released and is to be detached by the watchman or foreman. It contains blanks for the watchman's name, date released and remarks.

The triplicate copy, which is the shop card, is to be attached to the job in the shop. The stub of this copy is divided into two parts. One, the record of the repairwork, is filed alphabetically in the office. It shows name, date delivered, binder number, amount and remarks. The other part of the stub is the customer's receipt and contains—in addition to the repair order—the number, space for date promised, style of car and the license number. This check is presented to the cashier by the customer for the release of the car.

As the Ford agencies use standard prices, this form is not to be recommended to others. Even for Ford agencies we believe either of the other forms is preferable to the Miller form. The tendency in using this form is to get department costs instead of job

costs as few Ford agencies keep accurate time on each job.

One big item to be considered in all shops is the amount of chargeable or direct labor and the amount of non-chargeable or indirect labor. Indirect labor is an expense and materially affects the shop overhead.

The repair order is one of several links in the chain of efficient shop practice.

All shops of any size, to make their records adequate and complete should have the following forms on hand: Repair order, time card, sales ticket or invoice, purchase order, and stock requisition.

Next to the sales slip or invoice, the repair order is the most important.

We do not know of an item of bookkeeping that is given more attention in the trade journals than repair orders, shop orders or shop tags.

If the average garage owner would read his trade journal intelligently, he would soon be in a position to judge what kind of a set of books he is using—whether they are satisfactory or inadequate. In a few issues of the AMERICAN GARAGE AND AUTO DEALER, the writer has counted no fewer than four systems of shop practice outlined. They all possess good features.

Nearly every issue of your trade journal will give you a new idea in bookkeeping, or some new perspective. Send the AMERICAN GARAGE & AUTO

(Concluded on page 17)

| Name..... | Address..... | Shop Sales (Labor Only) | Cost or Payroll Sold | Hours Sold | Average Hourly Rate |
|--|-------------------------------------|-------------------------|----------------------|------------|--|
| \$..... | \$..... | \$..... | \$..... | \$..... | \$..... |
| Expenses—Total. | Basis of Distribution. | | | | Shop Portion. |
| Rent | Area | | | | |
| Advertising | Specific | | | | |
| Labor supervision..... | Specific | | | | |
| Labor, indirect..... | Specific | | | | |
| Salaries, officers..... | Specific or distributed expense.. | | | | |
| Salaries, clerical..... | Time used shop work..... | | | | |
| Commissions | Specific | | | | |
| Heat | Radiation required..... | | | | |
| Light | Lamps or K. W. hours..... | | | | |
| Power | K. W. hours..... | | | | |
| Water | Specific and number of employees | | | | |
| Gas | Specific | | | | |
| Bad debts..... | Sales or distributed expense.... | | | | |
| Insurance, fire..... | Specific | | | | |
| Insurance, compensation..... | Payroll | | | | |
| Insurance, employees' liability..... | Payroll | | | | |
| Insurance, theft..... | Number of jobs to department.. | | | | |
| Insurance, credit..... | Sales or distributed expense.... | | | | |
| Insurance, life co-partner..... | Sales or distributed expense.... | | | | |
| House truck..... | Hours used department..... | | | | |
| Depreciation building..... | Value | | | | |
| Depreciation furniture and fixture..... | Salaries, clerical..... | | | | |
| Depreciation machinery and equipment..... | Specific | | | | |
| Tools and tool expense..... | Specific | | | | |
| Telephone and telegraph..... | Specific number of calls..... | | | | |
| Association fees and dues..... | Specific and distributed expense | | | | |
| Printing and stationery..... | Specific and salaries, clerical.... | | | | |
| Repairs and alterations..... | Specific | | | | |
| Employment and welfare..... | Number of employees..... | | | | |
| Taxes | Value | | | | |
| Entertainment | Specific or arbitrary..... | | | | |
| Rebates and allowances..... | Specific | | | | |
| Legal and audit..... | Specific and distributed expense | | | | |
| Supplies, office..... | Salaries, clerical..... | | | | |
| Supplies, shop..... | Specific | | | | |
| Postage and revenue stamps..... | Specific and salaries, clerical.... | | | | |
| Express, freight, cartage, parcel post (out) | Specific | | | | |
| Trade papers and magazine..... | Specific | | | | |
| Outside labor..... | Specific | | | | |
| Donations | Sales or distributed expense.... | | | | |
| Spilled work..... | Specific | | | | |
| Loss and damage..... | Specific | | | | |
| Overtime | Specific | | | | |
| Miscellaneous, petty..... | Specific or distributed expense... | | | | |
| Total | | | | | |
| Hours sold..... | Overhead per hour, \$..... | | | | Total hour cost labor and O. H., \$..... |
| Direct hours, | indirect hours, | | | | |
| Labor ratio, direct, \$..... | indirect, \$..... | | | | |

This Schedule, Properly Filled Out, Will Give Carageman Most of the Important Statistics of His Shop Operation.

Regulating the Generator's Output

Demands Upon Automobile Generator Necessitate Voltage Within Certain Limits and Current Generated at Fairly Constant Value Over Wide Range of Speed—Examples of Two Popular Methods for Regulating Generator Output

By J. R. Bayston

The peculiar demands which are placed upon the automobile generator make it necessary to control the voltage within certain limits. Also, the amount of current that is generated must remain at a fairly

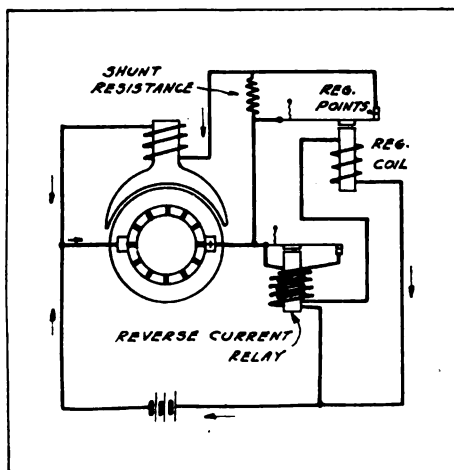


Fig. 1. Shows Vibrating Type Regulation.

constant value over a very wide range of speed.

It is impractical, owing to mechanical difficulties, to drive the generator armature at a constant speed regardless of the car or engine speed. It is, therefore, necessary to provide some means of keeping this output at a constant value. If the voltage increases above a predetermined value, the head-lamps will burn out and damage will also be caused to the ignition system.

There are two popular methods of regulating the output of a generator on the market at the present time—the third-brush method and the vibrating-regulator type. A number of other forms have been used in the past but, as most of these are obsolete at the present writing, they will not be taken up at this time.

A typical example of a vibrating type of regulation is shown in Fig. 1. In this system the amount of current generated by the armature is governed by the strength of the shunt field. However, this principle is true to all forms of regulation. The current that magnetizes the field flows from the positive main brush and passes through the regulator points, which are normally closed, through the shunt field and returning to the negative main brush.

As the charging circuit, which passes through the regulator coil, becomes of sufficient strength to overcome the spring tension that is holding the regulator points together, the points will open and cause the shunt current to flow through the shunt

resistance before going through the shunt field. This cuts down the value of the current flowing through the shunt field and thereby decreases the amount of current generated at the positive main brush.

It must be remembered that the amount of current induced in any generator is dependent upon the number of magnetic lines of force cut per second, and the number of magnetic lines of force in a field are mainly determined by the strength of the current flowing around that field. When the shunt field is reduced in strength, the corresponding reduction in the charging rate causes the regulator core to become demagnetized and the regulator points will close. The rapid opening and closing of the points occurs so fast that it is hardly visible and causes the output of the generator to remain at a fairly constant value.

The vibrating-regulation resistance type

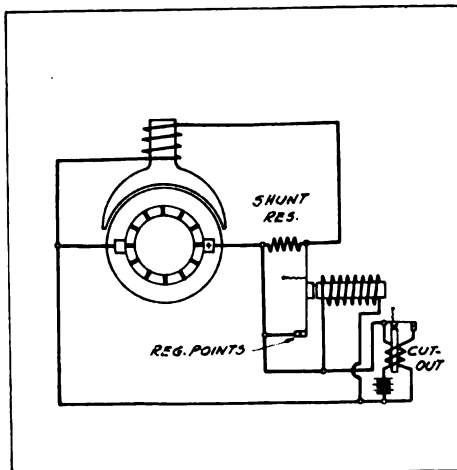


Fig. 2. Regulator Coil Connected in Parallel With the Battery.

is divided into two classes. The method of connecting the regulator coil determines their classification. Fig. 2 shows a vibrating regulator whose regulator coil is connected in parallel with the battery. This method of regulation is known as the constant potential type. In other words, this system is regulated by means of constant voltage.

The regulator coil is wound with a large number of turns of fine wire, and the amount of current flowing through this coil is determined by the voltage of the battery and the voltage of the generator. There will be more current flowing through this coil with a fully charged battery, as a battery in this condition offers more resistance to the flow of current through it.

This type of regulator has been used for some time by the Bijur people, its main ad-

vantage being that the output of the generator is controlled to a great extent by the condition of the charge of the battery. A heavy charging current will be produced when the battery charge is low but, as the battery becomes fully charged, the output of the generator tapers off gradually.

This is due to the smaller amount of current flowing through the regulator coil when the charge of the battery is low. The battery in this system can be removed from the car and the lights will operate quite satisfactorily, as the regulator will throw sufficient resistance into the circuits to prevent the output from increasing beyond the amount of current that the lights use.

The method of regulating the output by means of constant current is shown in Fig. 3. If Figs. 2 and 3 are compared, it will be noted that they are similar except that the regulator coil in Fig. 3 is connected in series with the charging circuit while, in Fig. 2, it is connected in parallel with the charging circuit. The regulator coil of the current-regulation type consists of a few turns of heavy wire, while the regulator coil of the voltage type consists of a number of turns of fine wire.

Referring again to Fig. 3, the current is collected at the positive brush of the generator. As the output increases, the magnetism of the regulator coil becomes of sufficient strength to overcome the spring ten-

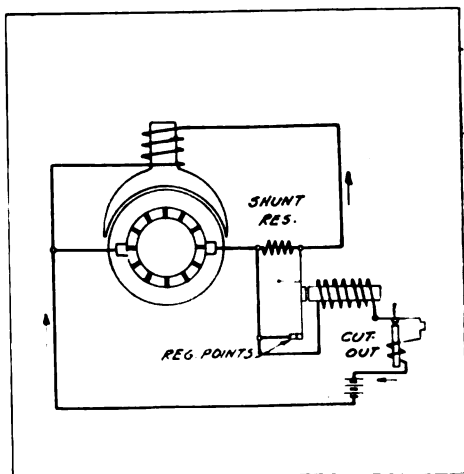


Fig. 3. Regulator Coil Connected in Series With Charging Circuit.

sion on the regulator points, causing them to open and throw in a shunt resistance in the shunt circuit.

The shunt current will then flow from the positive brush of the generator through the shunt resistance, through the shunt field, and back to the negative brush of

the generator. When the points are closed, the current will be through the points instead of through the shunt resistance. These points, like the ones in the constant-voltage regulator, operate at a very rapid rate and, on account of this rapidity, cause the out-

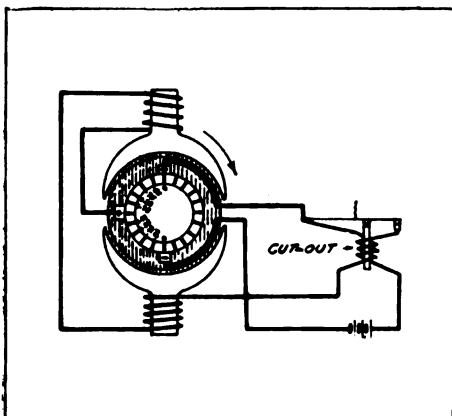


Fig. 4. Armature Revolves at Slow Rate of Speed.

put of the generator to be held within certain limits. This form of regulation is typical of that which has been used on the Remy and other systems for several years. Most Remy systems, however, at the present time, are of the third-brush regulation.

In order to increase the output of the current type of regulator, it is necessary to increase the spring tension on the regulator points. This will prevent them from opening until a higher value of current is obtained from the generator. In order to regulate the output of the voltage regulator, no attention should be paid to the amperes generated, as this will depend entirely upon the condition of the battery. The regulator spring must be adjusted so that the voltage will not exceed 8 volts in the case of a 6-volt system.

There is, however, a certain disadvantage in the vibrating type of regulation, and manufacturers have been constantly busy in experimenting with forms of regulation, so that a method of control much simpler in operation and less expensive to manufacture could be produced.

The result of this experimenting is the third-brush method of regulation. Generators having this type of control have an extra brush, called the third brush, located between the two main brushes. In case it is a four-pole, four-brush machine the "third brush" would be the "fifth brush."

Referring to Fig. 4, the magnetic lines of force pass from the north field pole, through the armature coils, and into the south field pole. In this illustration, the armature is revolving at a slow rate of speed. The magnetic lines of force pass in straight parallel lines. The figures on the commutator bars represent the voltage drop between each bar. The sum of these voltage drops, when one-half of the commutator is considered, will equal the voltage between the main brushes.

In Fig. 4, the generator is producing eight volts. Attention is called to the fact that

these figures are not absolutely accurate figures but have merely been selected as relative values for the sake of illustrating the principle of third-brush regulation.

The third brush in Fig. 4 is a positive brush. In other words, the current collected at the third brush has a voltage equivalent to the figures between the third brush and the negative main brush which, in this case, is four volts. Let us assume, for the sake of illustration, that the shunt field has a resistance of one ohm. We will then have a current flow of four amperes through the shunt winding.

It is evident that, if water in a bucket is stirred with a stick, the water will have a tendency to follow the stick around and, as we increase the speed of stirring, the movement of the water will also be increased. This is also true of magnetic lines of force. As the speed of the armature increases, there is a tendency for the magnetic lines of force to be twisted out of shape and to follow the movement of the armature rather than to pass straight across from the north to the south pole.

Fig. 5 shows the field when the armature is turning at a high rate of speed. At this time, the magnetic lines of force are not distributed evenly at all points of the field but have a tendency to pile up at the points *a* and *b*.

Bearing in mind that the greater the number of magnetic lines of force cut per second, the greater will be the output of the generator, it is at once noticed that the output of the armature in Fig. 5 would be much less than that shown in Fig. 4. The third brush is now bearing on a segment which has the same relative position, but

field strength and the number of lines of force traveling from the north to the south field is greatly reduced. As the armature is traveling at a higher rate of speed, it will still be cutting the same number of lines of force per second and the output of

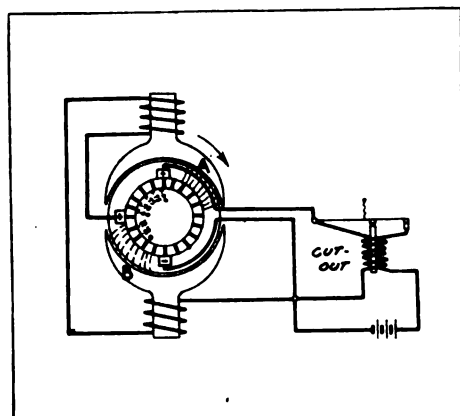


Fig. 5. Armature Turning at High Rate of Speed.

the generator will be practically the same as in Fig. 4.

As these magnetic lines of force are twisted out of shape, the drop between the coils varies considerably.

Increasing the charging rate of a third-brush generator is very easily accomplished. Referring to Fig. 5, it will be noted that, if the positive third brush is moved in the direction of rotation, there will be a greater voltage between this brush and the negative main brush and, as this voltage is increased, the strength of the shunt field will be increased and the output of the generator also increased. If the output is to be reduced, moving the third brush in the opposite direction from rotation will reduce the current in the shunt field and the output accordingly.

A rather novel combination of regulation has recently been placed on the market by the Delco people—one of the typical installations being on the 1921 Pierce Arrow cars. This regulation consists of a combination third-brush generator and a vibrating regulator.

The connections for this system, as used on the Pierce Arrow car, are shown in Fig. 6. The regulator coil of this system is wound with sufficient resistance to prevent the regulator points from being opened when the battery is discharged. The points then remain closed constantly and the generator acts as a simple third-brush machine, the output being controlled only by the third-brush.

As the battery becomes charged and approaches a specific gravity of approximately 1.250, the resistance of the battery increases and more current will then be forced through the voltage coil of the regulator. The regulator points then begin to vibrate, throwing the resistance in the shunt circuit and cutting down the generator output.

In Fig. 6, the voltage coil consists mainly of an electromagnet having three wind-

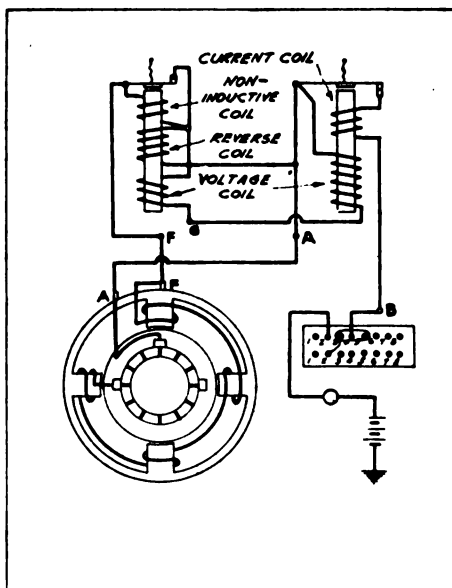


Fig. 6. Delco System Used in Pierce Arrow.

the voltage drop between the commutator bars from the negative brush to the third brush is now only one volt.

As the resistance of our shunt field is one ohm, there will be a current of one ampere flowing through the shunt field instead of four. This naturally decreases the

Onnisty and Sistem Is Our Motto

Bob Sez a Man's a Fool if He Goes and Makes His Frunt of His Place Enny Way but Nice and Cleen—The Boss Has Bin Getting Sum New Sistem in the Offis and Buleev Me Heez a Good Bizness Man—Weer Up to Dat Heer

By Frank Farrington

Deer Pete:

You probably dont unpack your goods out on the sidewalk in frunt of the store. Neither do we. At least we dont enny more. When the boss was away yesterdy a crate cum along by xpres and it was full of flivver fenders. Persy opend her up rite out in frunt by the gas pump and pretty soon he had nales all over and stix and everything, and a poleesmun cum along and sed: "What the hel you doing here ennyway. Get this stuf inside and cut out all this muss on the pavement." Persy was going to put up a fuss but the poleesmun just sed for him to shake a leg or heed get waked up with a nite stick.

They's a rule in Pike citty you cant put boxes and crates and such things on the sidewalk and in fokes way and they make you be good, too, but Bob says a

mans a fool if he goes and makes the frunt of his place ennything but nice and neet and cleen.

He says if ennybody tares their cloze on a nale on a box when they go by, or if they get a puncktur on your nales, or if they haf to walk careful in frunt for feer of stix and nales, they aint going to feel so frendly about your place and mebbly you looz sum bizness. But you kno, Pete, we used to unpack stuf on the sidewalk in old Pinkvill and we used to leev boxes and barls there all day sumtimes. I gess times is more up-to-date now.

The poleesmun aint the only one that handed it to Persy eether. He cum in the offis in the afternoon, Persy did, and when he went by where Sally Rader stood, Persy tride to chuck her under the chin, but he diddent get by with ennything like that. Sally

handed him a slam on the map that sounded like hitting a table with a bord, and if she haddent I wood of. So I gess Persy knoze he aint got anny stand in with Sally.

Persy kind of laid that slam up agenst me and he tride to get even on me today. He saw me when old J. B. Cortvelt—one of our best customers—cum in and wanted a toob for

cheep, and that was becaws they made em small and when you bloo em up full size they was about as thick as a nats wing and not haf so strong. So I just figgerd that old J. B. was too good a customer of ours to let him buy one and hav it bust on him."

"Why diddent you just tell him it was the best we had and he cood take it and use it if he had to?" Persy askt.

"That woodent made him feel enny better if heed used it and it went flat," I said. "I thawt it wood be better for him to buy one sum other place and think what onnist fokes we are than to buy that cheap Jinx and think how he got stuck, whatever he pade."

"Youre too onnist for your own good," sed Persy. "You must think this garaje is a Sundy skool class."

"Shush!" sed the boss to Persy. "If you had as much of

an idea of how to be onnist as William has, youd be a 1000 times as onnist as I ever expect you to be." Then the boss told me Ide dun just rite and that if more garaje fellers wood treet customers on a Sunday skool class base it wood be better for their bizness. So thats as neer as Persy cum to getting even with me on that deel, but I spoze Ide better keep my eye peeld or heel be putting sumthing ovr on me sum other way.

The boss has bin getting sum new sistem in the offis and buleev me heez got it rite. If a feller walks in and says, "How are you, Mister Hecker? How much do I oe you today?" the boss dont haf to say: "Well, I aint got your bill reddy, but Ile hav the girl get it out and mail it in to you and youll get it tmorro." Not much he dont.

He opens a nice little case with a



"Sally Handed Persy a Slam on the Map That Sounded Like Hitting a Table With a Bord, and If She Haddent I Wood Of."

his limozeen and I lookt the toobs over and I shode J. B. the only toobs we had in a rite size, a 35x5, and I told him I was sorry but I diddent buleev heed like that toob and that weed rather he woodent take it becaws it woodent giv him satisfackshon.

J. B. sed he was going away and heed got to put a new toob in one of his spares. "Well," I sed, "I drather you got one sumwhere else than for you to take this one and mebbly hav it go kerflooie on you."

Persy coodent see that kind of talk and he told the boss about how I was dubbel crossing him and telling the best customers to go to sum other garaje. The boss calld me in and wanted to kno about it and I told him. I sed: "You kno what you sed about them Jinx toobs. You sed they werent much good becaws they were

glass top and all fireproof stuff and he looks in where that man's bill is and he says, "You owe me twenty-five-fifty," and then the feller cums acrost with the munny. If enny feller thinks he can make a bluf at being going to pay and then not pay becaws the bill aint reddey, the boss fools him good on that.

And that aint all. If a feller cums along and gets 17 gals of gas and wants to kno how much it is, the boss dont haf to go in and get a pad of paper and a pencil and multiply it all out. Heez got a little list pasted rit up on the pump and it says the price of all quantitys of gas all the way from 1 gal up to 25 gal. The feller that pumps the gas looks at the list as soon as he ends the last stroke of the pump and he knoze how much enny number of gals is just as qwick as he knoze how menny heez pumpst. I gess that aint pretty snappy, hay Pete?

And that aint all yet. Heez got sum sistem on the bills he gets for enny-thing that cums in, and just as soon as heez o kd a bill Sally puts it rite where it belongs and the boss can get it in a minnit—in less than a minnit. In about a seckond, I gess.

A man cum in yesterdy and wanted to kno about 1 thing that was on his bill and he sed: "What was this stuff and why?" You see the bill diddnt explain all about it becaws a bill aint a hole letter.

Well the boss reacht into that sistem of his and pulld out the bill that told what stuff was and all about it and he told that man about it before he cood say jack robbison. He cum rite back so qwick the man was scairt, and the man says: "Say, you got sum sistem aint you?" And the boss sed, "You tell em I got a sistem. Weer up to dat heer, all rite."

Thats the way to be a good bizness man, Pete. You better hav your boss get him one of thoze sistems so youll be up to date and then sum.

Your sistimmatick frend

Bill.

GARAGE ACCOUNTING

(Concluded from page 13)

DEALER samples of your repair order or shop card. Let us know how you handle work orders as well as how you record, charge and check time and material.

The schedule given in this article, when properly filled out, will give you the most important statistics of your shop operation. It will show you the weak points and put you in a position to nurse them or cure them, whichever the case may require.

Before you start to fill in this schedule, read over again the August, 1921, article on expense distribution.

The Farmer, The Dealer, The Banker

Power Farming Equipment Plays Highly Important Part in Community Life of Present Day—Modern Methods Needed in Farming as in Other Fields of Industry—Dealers and Bankers Show Willingness to Co-operate with Farmer

By F. H. Sweet

The part played in the life of the community today by the dealer in power farming and automotive goods is no inconsiderable one and, with the present-day rapid advent of the tractor and truck on the farm, is receiving acknowledgment as one of the leading factors in successful agricultural community development.

It is a fact that today but an exceedingly small fraction of the farms in this country are taking advantage of the labor-saving, production-increasing machines that are on the market. As a result, the whole world loses—the farmer because his operating costs are so high as to eat up a large share of his income, and the consumer because food production is low and prices are high. Another influence of modern power-farming machinery—and a vitally important one—is the stemming of the cityward tide of boys. Give the average farm youth a complete outfit of up-to-date equipment, including a tractor for his field work and a truck for his road work, and the farm becomes a far more interesting place and with a much stronger appeal than the city could ever hold out.

If it is to prove popular with the coming generation, however, agricultural production must be dignified with administrative effort in true keeping with its position—modern methods must be applied to farming as they are to other fields of industry.

It is a well-known fact that the business men of the town mold the habits of the farmers tributary to this particular community. Hence, the opportunity for the power-farming dealer and his banker to increase farm production, reduce costs and, in general, raise the standard of operation on the farms in their community.

Bankers as a whole are today thoroughly alive to the advantages of power equipment on the farm, and show themselves willing to co-operate in extending the power farming dealer's program. The dealer has two financing problems to cope with. First, he must take care of his wholesale shipments, and then he must finance his retail sales.

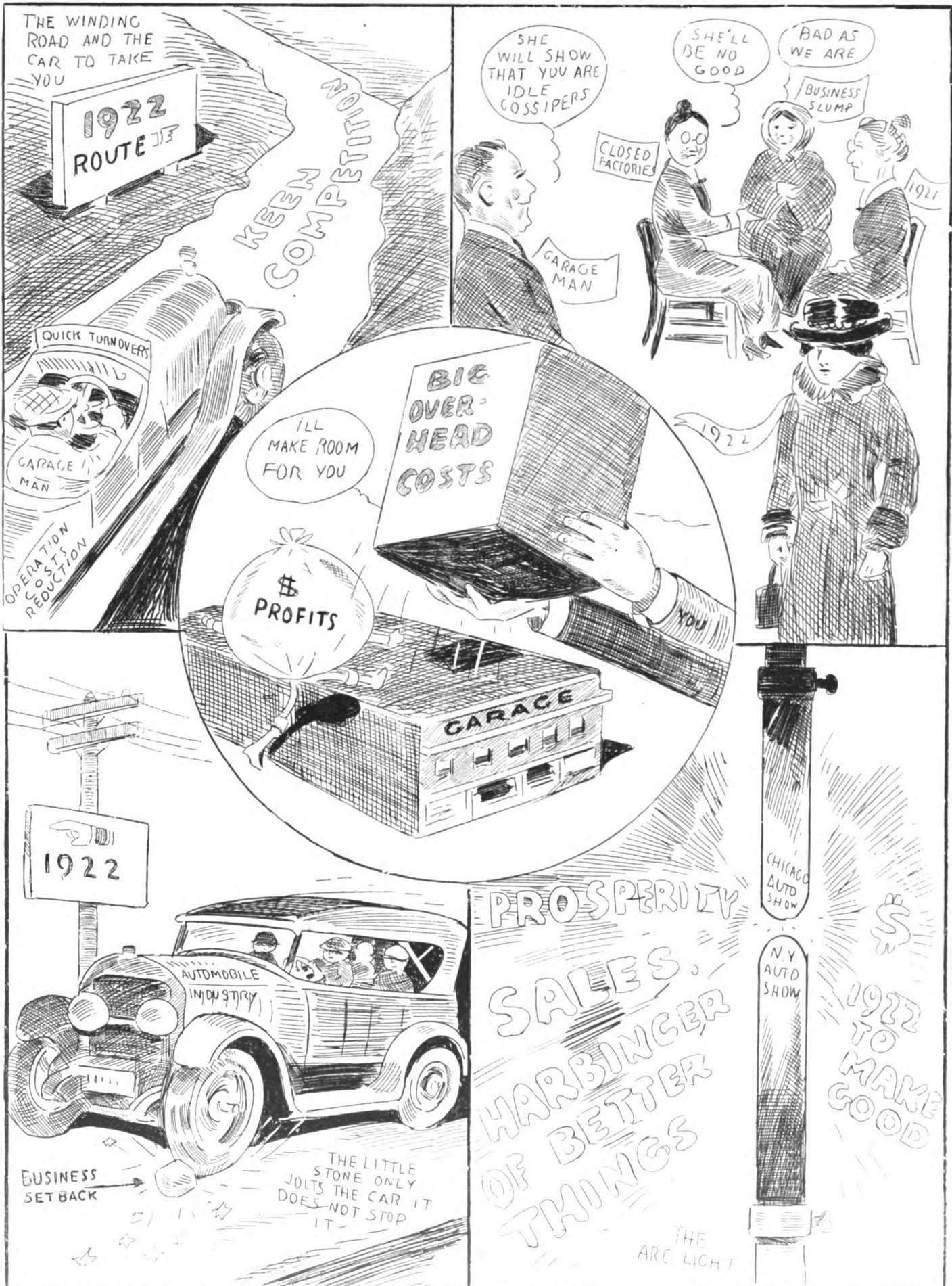
Most dealers require accommodation of some sort in handling wholesale shipments of tractors, trucks, automobiles, etc., in car-load lots—the only economical way to handle these goods on account of the saving in freight. Accommodation with respect to wholesale shipments is today being generally accorded by bankers; warehouse receipts, or trust receipts covering the goods shipped, being held as collateral, and proceeds of retail sales being applied as made to reduce the obligation given for wholesale shipments.

Assuming that the dealer has been satisfactorily taken care of on his wholesale requirements, let us consider the proposition from a retail standpoint. A good customer

comes in to buy a tractor, a tractor plow and a disk. The entire sale amounts to something over \$2,000. This customer owns 240 acres of good land, clear of encumbrance, and bears a good record in the community. However, he can pay only \$500 in cash on his purchase at present, and wishes time on the balance until fall.

It is obvious that the dealer, having paid cash for his tractor wholesale, must have his settlement with his customer on a basis that will enable him to get his cash from the transaction. Here is a proposition that is just as much a necessity to successful farming as a good barn, and the banker who finances the tractor sale gives his customer a lift toward the goal of financial independence, and helps him to put his farm on a basis approximating the modern science of management. The tractor, truck, automobile or other power-farming implement is of itself good security and lends itself as an additional factor of safety collateral to the loan.

The automotive industries, just at this time, are playing a very important part in cementing together in a bond of common relationship the farm and the town. When it is known that 38 per cent of the entire gross volume of business out of at least two of our large cities for one year was automotive—tractors, trucks, automobiles, power implements, accessories, etc.—one realizes the extent to which this business has grown.



Liability for Injuries During Strikes

Where Employer Uses Strike-Breakers in Case of Labor Troubles Some Important Questions of Liability Arise—Is Employer Held Liable Under Compensation Acts or Does the Workman Have a Right to Sue for Damages?

By Chesla C. Sherlock

There are two broad instances in which the employer's liability comes into question in relation to strikes, and we will treat them briefly. They both ground in the common law and in the statutory law, either in the workmen's compensation acts or in other legislation enacted to cover the special cases which may arise independent of the compensation legislation.

If a strike-breaker is employed, and is injured while engaged in his employer's work or trade, he is unquestionably entitled to compensation under the workmen's compensation acts, for he is a "workman" within the meaning of that legislation.

Suppose that a workman is at his bench engaged in his duties. A striker hurls a brick at him or fires a shot which causes injury or death. The strike-breaker is entitled to the relief allowed under the workmen's compensation acts because his injury has arisen out of and in the course of the employment, *with this important exception*: If the injury was caused with the wilful intention of another employe to injure the strike-breaker employe, then, in some states, no compensation is payable.

Do not jump to conclusions. Is a striker an employe of his former employer when he is off on a strike? That is a matter which has not been conclusively decided by the courts and which will have to be decided by them before it can be determined in some states whether the employer is liable under the compensation acts for the injuries received by a strike-breaker while at work, at the hands of strikers.

This section in the compensation acts of some states was unquestionably put there for the purpose of preventing workmen, or others, wilfully defrauding the employer by injuring themselves or others in order to receive compensation. It was also put there for the evident purpose of stopping fighting and assaulting upon the employer's premises, for workmen sometimes get into fights with each other and they very often injure one

another. This sort of injury clearly does not arise "out of and in the course of" the employment.

The Iowa statute, for instance—and some such declaration is found in many of the other states—reads: "No compensation under this act shall be allowed for an injury caused by the employe's willful intention to injure himself or to willfully injure another." It would appear, from this, that the moving cause of the injury would have to arise from a wrongful act of *an employe*.

If the courts should decide that such an injury was outside the scope of the workmen's compensation acts, then the employer's liability would be judged by common law standards. Under the common law, the employer would not ordinarily be liable, unless the injury arose through his own negligence. If he had not been guilty of negligence and had done all that a reasonably prudent person could have done under the circumstances, then the injured workman or his dependents could not collect compensation or damages from him.

There is only one other case, then, wherein there can be an imputation of liability on the part of the employer, and that must arise out of the contract relation between the employer and the workman. That is to say, the contract or agreement of employment will be examined to see if there is any basis of liability contained therein. If some such basis of liability is found therein, the courts will construe it in the light of the statutes and the common law to determine, in turn, whether any liability in fact rests upon the employer.

Employers know that it is generally a very hard matter to secure men to work in plants where a strike has been declared, because the strikers are generally in earnest and they often do not hesitate to resort to violence in order to secure their demands. They expect employers to shut up and stay shut up while they are out on the strike and, if the employer has no disposition to surrender so mildly, they often set out to compel him to do so by beating up,

threatening or even forcibly ejecting those who do go to work for him.

This situation is only too well known to men who seek employment as strike-breakers, or who are sought for that purpose by employers. They know that violence is very apt to occur and they generally will not go to work for the employer unless he is willing to make special guarantees in their case in the event they are injured or killed while in his service.

This has naturally made it necessary for employers fighting a strike to enter into special contracts to take care of the injured men, in the event such injury or death is caused at the hands of the strikers.

These contracts are a part of the agreement between the parties, and are construed as being a part of the contract of employment by the courts.

But this does not say that their legality is thereby established or that they will be construed to mean the things at law that the casual observer might think they meant by a first reading.

We must not lose sight of the fact that the real rights between the parties does not rest upon the spoken or written word, but that it rests in the *LAW* as found, either in the statutes or in the old common law.

The first thing the courts will do, when they have such a contract placed before them, is to run back to the law and find out what the basis of liability is in that great body of fundamental rights between men.

We have found that there can be slight doubt of the employer's liability to pay compensation to strike-breakers who are injured on his own premises while at work.

The next question to be considered is probably the most important of the two, and that is the employer's liability for injury caused to strike-breakers while away from the employer's premises, and with special reference to special contracts that may exist between the parties. That will be taken up and discussed in detail in our next article in this department.

How to Make the Drill Press Pay

Methods for Laying Off and Drilling Steel Brackets and Drilling Tempered Steel, Aluminum and Glass Discussed in This Final Installment of Article on Profitable Operation of Drill Press—Charts of Various Drill Sizes Given

By Gustav H. Radebaugh

When making repairs on machines such as harvesting and threshing machinery, it oftentimes is necessary to join broken castings together with steel brackets or straps. These can be supplied from the forge.

One of the common difficulties in making

the hole must be drilled in the center of this layout. Too many times jobs of this kind are not properly prepared for accurate drilling. Never drill a hole in a job unless the location desired for the hole is established by a center-punch mark. The

To guarantee a good alignment of holes, it is necessary to keep the drill within the layout circle. To do this the drill should be fed into the work to a depth of half the height of the drill point, as shown in Fig. 12. After this is done, the drill is

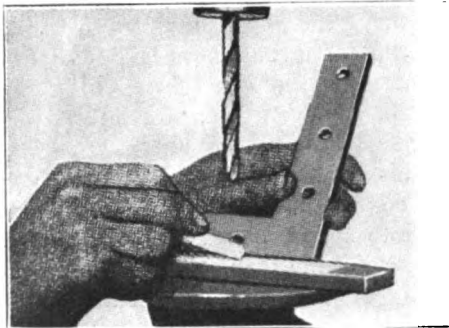


Fig. 8. Use Chalk to Transfer Hole Centers.

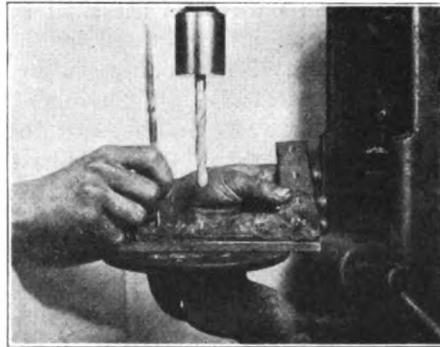


Fig. 9. Mark Hole Locations With Scribe.

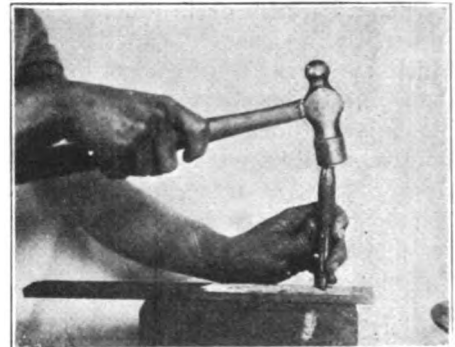


Fig. 10. Center Punch In Center of Hole Layout.

this type of repair is the inaccurate drilling of the holes, which makes it impossible to insert bolts or cap-screws without filing out holes. This indicates that not enough care was exercised in locating the drilling centers.

Laying Off and Drilling Steel Bracket.

Locating the drill center for a bracket job, such as shown in Fig. 8, can be made a short job by following the practice of the trained mechanic. If the holes have not previously been drilled in the bracket, this should be done. Good judgment must be used in the proper location of these holes in relation to the part being patched. The surface on the job where this drilled bracket is to be located is well chalked with starch or carpenter's chalk.

The bracket is next put into place, and the outlines of the holes are made with a scribe or scratch awl on the chalked surface, as shown in Fig. 9.

If these holes are going to line up with the holes in the bracket, it is obvious that

center punch is shown in use in Fig. 10. The finished layout is shown in Fig. 11.

This job is now ready to be drilled, but only to a depth which will permit checking

| Automobile and Tractor Tap and Drill Test. | | |
|--|------------------------|----------------|
| Size of Tap. | U. S. Thread Per Inch. | Size of Drill. |
| 1/4" | 28 | 7/32" |
| 5/16" | 24 | 17/64" |
| 3/8" | 24 | 21/64" |
| 7/16" | 20 | 3/8" |
| 1/2" | 20 | 7/16" |
| 9/16" | 18 | 1/2" |
| 5/8" | 18 | 9/16" |
| 11/16" | 16 | 39/64" |
| 3/4" | 16 | 43/64" |
| 7/8" | 14 | 51/64" |
| 1" | 14 | 59/64" |

the drilling center with the layout. It is very common for drills to "run" or change the drilling center from the original layout. This is the cause of many difficulties when fitting bolts or screws in the drilled holes. The holes do not line up, so it becomes necessary to file until a good fit is made.

lifted from the work and the drilling center is compared with the layout circle. If the drill has "run," it will show up very clearly, as the partially drilled hole will be at one side of the layout circle.

Our problem, then, is to bring the drilling position back to the correct center. This is done as shown in Fig. 13. A round-nose chisel is used to change the center. This operation is known as drawing a hole. A hole cannot be drawn if the drill has penetrated the metal to the full diameter of the drill.

It has been stated that the drill should only be fed into the work half the depth of the drill points. In doing this, several attempts can be made in the drawing operation before the hole is drilled to full diameter. After the drilling position has been drawn to the center of the layout circle, the hole is ready to be drilled.

In reviewing this drilling job, it is seen that we have followed the trade practice of the mechanic. Lay out the hole, from the



Fig. 11. Check Center Punch Hole With Layout Circle.

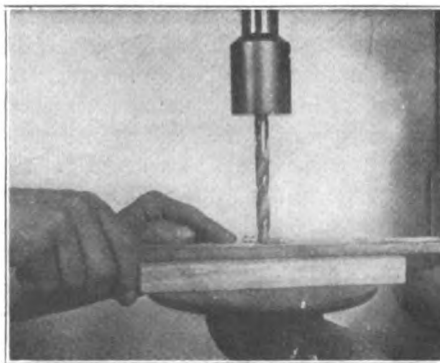


Fig. 12. Start Drill in Center Punch Mark.

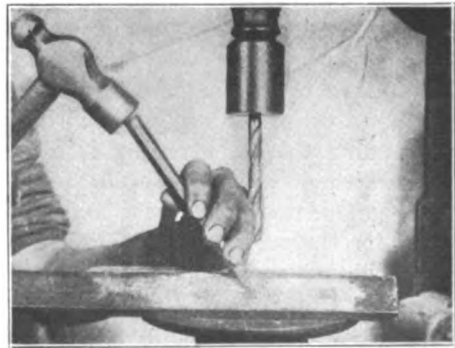


Fig. 13. Draw Hole to Center Using Round Nose Chisel.

templet or drilled bracket—using a scribe or a scratch awl—centering the job with the center punch, and drilling of the hole to check for position. If the drill “runs,”

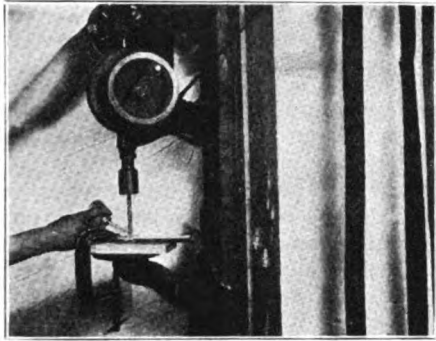


Fig. 14. Screw Clamps Hold Job on Table.

the correct position is regained by using the round-nose chisel or gage. With the drilling position correct, the job is now ready to drill.

The speed and feed of drills used in repair drilling can be determined by actual practice, exercising good, sound judgment.

Table of Sizes of Tap Drills

| Tap Diameter. | Threads per inch. | Drill for V Thread. | Drill for U. S. Standard. | Drill for Whitworth. |
|-----------------|-------------------|---|---------------------------|----------------------|
| $\frac{1}{16}$ | 16, 18, 20 | $\frac{1}{16}$ $\frac{1}{16}$ $\frac{1}{16}$ | $\frac{1}{16}$ | $\frac{1}{16}$ |
| $\frac{1}{8}$ | 16, 18, 20 | $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ |
| $\frac{9}{16}$ | 16, 18 | $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ |
| $\frac{1}{4}$ | 16, 18 | $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ | $\frac{1}{4}$ | $\frac{1}{4}$ |
| $\frac{5}{16}$ | 14, 16, 18 | $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ | $\frac{5}{16}$ | $\frac{5}{16}$ |
| $\frac{3}{8}$ | 14, 16, 18 | $\frac{3}{8}$ $\frac{3}{8}$ $\frac{3}{8}$ | $\frac{3}{8}$ | $\frac{3}{8}$ |
| $\frac{7}{16}$ | 14, 16 | $\frac{7}{16}$ $\frac{7}{16}$ $\frac{7}{16}$ | $\frac{7}{16}$ | $\frac{7}{16}$ |
| $\frac{1}{2}$ | 14, 16 | $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{1}{2}$ |
| $\frac{5}{8}$ | 12, 13, 14 | $\frac{5}{8}$ $\frac{5}{8}$ $\frac{5}{8}$ | $\frac{5}{8}$ | $\frac{5}{8}$ |
| $\frac{3}{4}$ | 12, 14 | $\frac{3}{4}$ $\frac{3}{4}$ $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ |
| $\frac{7}{8}$ | 10, 11, 12 | $\frac{7}{8}$ $\frac{7}{8}$ $\frac{7}{8}$ | $\frac{7}{8}$ | $\frac{7}{8}$ |
| $\frac{15}{16}$ | 11, 12 | $\frac{15}{16}$ $\frac{15}{16}$ $\frac{15}{16}$ | $\frac{15}{16}$ | $\frac{15}{16}$ |
| 1 | 10, 11, 12 | 1 1 1 | 1 | 1 |
| $\frac{1}{8}$ | 10 | $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ |
| $\frac{1}{16}$ | 9, 10 | $\frac{1}{16}$ $\frac{1}{16}$ $\frac{1}{16}$ | $\frac{1}{16}$ | $\frac{1}{16}$ |
| $\frac{1}{32}$ | 9 | $\frac{1}{32}$ $\frac{1}{32}$ $\frac{1}{32}$ | $\frac{1}{32}$ | $\frac{1}{32}$ |
| $\frac{1}{64}$ | 8 | $\frac{1}{64}$ $\frac{1}{64}$ $\frac{1}{64}$ | $\frac{1}{64}$ | $\frac{1}{64}$ |

In commercial shops, when drilling steel, a peripheral speed of 30 feet a minute is the prevailing practice, for cast iron 35 feet, for brass 60 feet, using a feed of 0.004 to 0.007-inch per revolution for drills larger than $\frac{1}{8}$ -inch diameter.

Another example of speeds for drilling is the comparison of the $\frac{1}{4}$ -inch drill, revolving at a rate of 611 r. p. m., and the $\frac{3}{8}$ -inch drill revolving at a rate of 203 r. p. m. This speed will give the peripheral speed of 40 feet per minute.

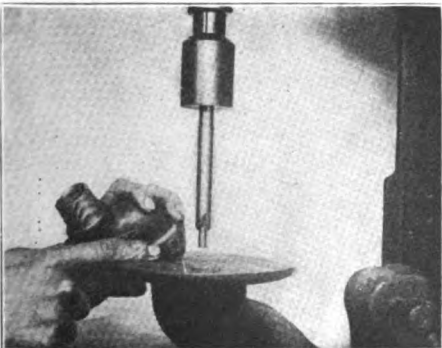


Fig. 18. The Counterbore and Spot Face.

Clamping Jobs on Platen of Drill Press.

Often the work done on a drill press is large enough so that it will not move under the action of the cutting drill. However,

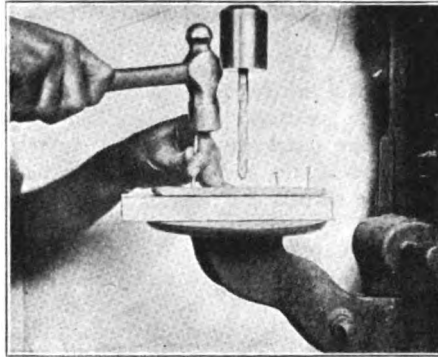


Fig. 15. Drive Nails in Drill Block for Safety.

many jobs are drilled that necessitate clamping the job to the platen of the drill press to insure accurate drilling and prevent the breakage of drills.

One of the most convenient clamps is the malleable iron screw-clamp shown in use on the drilling job in Fig. 14. Clamps taken from old clothes ringers make very serviceable parts for drill-press work. Notice that on this job a block of wood is being used under the job. This protects the drill-press platen. Another scheme that is used on a short piece of stock being drilled is shown in Fig. 15.

Many times pieces like this one are held with the hand. This is very bad practice for, if the drill should catch, there is danger of injury to the hand. In drilling small holes it is understood that the job could be held by hand, but it is always better to clamp a job when drilling holes larger than $\frac{7}{16}$ -inch. Many drills are broken and hands injured by drilling a bent bracket without holding it with a wrench or clamp.

In Fig. 16 a typical job is shown. This type of job is known as one of the most dangerous of the drilling operations. It is better, then—to prevent the breakage of drills—that all bracket jobs should be securely clamped to the platen or the job held firmly with the monkey-wrench.

Drilling Tempered Steel, Aluminum, and Glass—Lubrication Used.

Hardened steel may be drilled by using turpentine or kerosene. For soft steel and wrought iron use lard oil or machine oil.

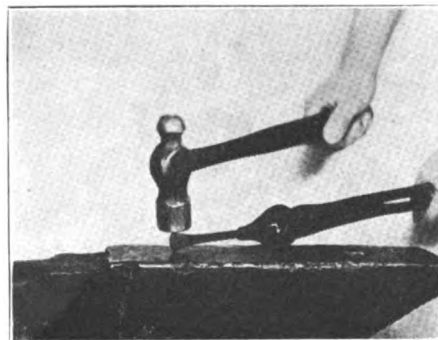


Fig. 19. Flat Drill Made From Hayrake Tooth.

Mowing-machine, sickle-bar blades, being hard, present a good example of the drilling possibility of hardened steel. In Fig. 17 the job is shown on the drill press, a

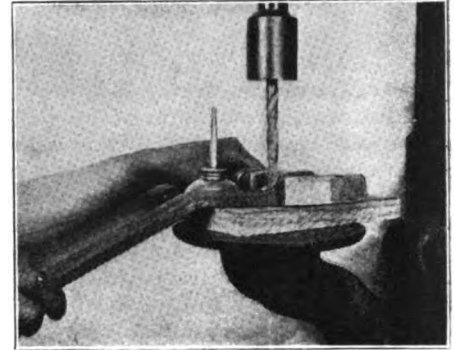


Fig. 16. Use Wrench When Bracket Drilling.

$\frac{3}{8}$ -inch hole being drilled in the hardened blade. The drilling of hard metal is facilitated by using turpentine as a cutting compound and by grinding off the sharp angles

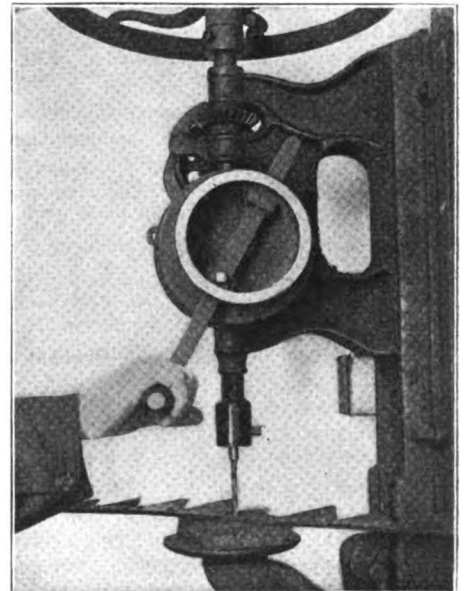


Fig. 17. Drilling Hard Steel.

of the cutting edge of the drill, as explained for cutting brass and soft metals.

This permits a heavy feed without chipping the edge. Practice will prove that a somewhat slower speed of the drill will be required for drilling hardened steel than the speed used for drilling soft steel. In

(Concluded on page 25.)

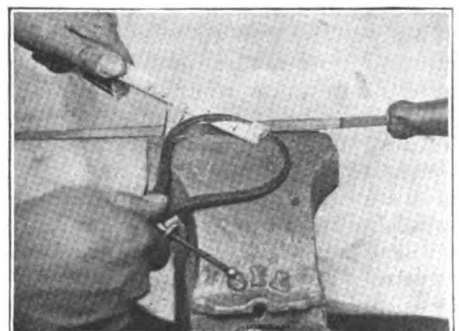


Fig. 20. Measuring Width Flat Drill.

Glimpses in the Garageman's World

"Broken Glass" Car Brings Comfort to Motor Traveler and Proves a Good Advertisement for the Southern California Automobile Club—"Just Keep Up-to-Date" Is Formula of Oregon Garagemen for Increasing Business

Broken-Glass Car Serves Motorists.

When a car like the "Broken-Glass Car" and crew of the Southern California Automobile Club circulates about the streets, it is a fine advertisement for automobiles and gives car-owners and prospects a concrete idea of how they will be protected after they join a local club. It cannot help being a benefit to dealers who co-operate with a club or other organization in such work.

Largely as a matter of education, the Automobile Club of southern California ran a broken-glass car on a week's trip in and around Los Angeles.

So many reports of the broken-glass bug-bear had been pouring in to the club that it was felt that the motoring public needed to take notice and do its share to mend the evil. In the week's trip the crew gathered 186 pounds of broken glass and covered 815 miles.

The car was so placarded as to get the attention of others. While this car was used for the week only, the club has a standing offer to answer telephone calls—night or day—with one of its four White trucks and remove broken glass from the streets.

The Automobile Club of southern California is said to be three times larger than the next largest similar organization of the world.

"Just Keep Up-to-Date—"

"Garage patronage will respond in direct ratio to the service and facilities provided." This statement is the basis upon which two brothers, Charles L. and Ray Williams, have built a sparkling garage and accessories business in the small western Oregon city of Seaside.

Since the brothers began business seven years ago, they have been alert to grasp the needs of the automobile-owning public. Their perseverance and far-sightedness have produced a trade which is the target of ambition of many aspiring garagemen throughout the Pacific Northwest.

Seaside boasts a normal population of 3,000 inhabitants, although its summer population far exceeds this number. The resort city is known as the "Atlantic City of the Pacific Northwest," and takes commendable pride in accomplishing its civic undertakings in a remarkably thorough manner.

A four-mile concrete sea-wall, embellished for its entire length with electric lights, is an attractive feature which has just been completed, and a concrete pier extending a mile into the sea will be the next municipal venture. Therefore, the claim of the Williams brothers that there is no more modern garage on the Pacific Coast is not an empty

boast but is justified by an accomplishment entirely in accord with the spirit and progress of the smart little coast city. In fact, the mood of the resort is such that one would be surprised if he did not discover the most up-to-date of institutions within its incorporate borders.

The Williams brothers began as garage proprietors at Seaside in 1914, when they managed a modest establishment. They mastered their profession thoroughly and, when the time to expand was ripe, erected their present garage. The new building was built along lines dictated entirely by the two brothers. The ground space covered by the structure is 100 by 150 feet. Only four posts interrupt the continuity of an otherwise unbroken covered floor space. The roof is oval and is held in place by latticed supports. The design is similar to that of the famous Mormon temple at Salt Lake City, Utah.

During the winter season, western Oregon receives heavy rainfall and, to alleviate as much as possible the inconvenience from this source a covered alcove was built under which cars may run while taking on water and air.

A splendidly-equipped ladies' restroom is provided. The salesroom and parts department occupy a space of 20 by 30 feet each. Two entrances to the garage for machines—one for entering and one for leaving—aid in the rapid disposal of cars. The garage is open 24 hours a day.

Patrons of the Williams brothers garage are grateful for a special inspection service which is rendered them free of charge. Often, assert the brothers, automobile own-

ers are not aware that their cars are suffering from certain defects or are costing excessive amounts to run on account of some overlooked or unnoticed condition.

Therefore, cars at the garage are carefully checked over and, if any remedying is needed, a small card upon which is written the needs of the car is left in the driver's seat. A tire may be on the ragged edge where a few more miles of wear would reduce it to worthlessness but which could be repaired at the time of inspection for a few dollars. A gas tank may be faulty or a radiator may be leaky. A hundred and one things with which motors and cars are commonly afflicted may be in need of attention which, if corrected, would result in a substantial saving to the owner.

The result of this special service has been astonishingly successful. Car owners appreciate it for they realize that "a stitch in time" saves many a dollar, and the garage operator profits both financially and morally, for he gains prestige among his clients for his alertness and attention.

So highly successful has this simple system been that many national tire concerns and garagemen throughout the country have written to the Williams brothers asking for samples of the special inspection cards and a brief explanation of the plan employed.

"Just keep up-to-date and let your patrons know that you are in the business for their good as well as your own," is the parting advice of Charles and Ray Williams to garage managers who are wishing to increase patronage and profits.



Two Entrances to Williams Bros. Garage, Seaside, Ore., for Machines—One for Entering and One for Leaving—Aid Rapid Disposal of Cars.

The Practical Side of Headlights

Cause of Mistakes in Lens Design Explained—Glare Always a Sign of Inefficient Light—Some Suggestions for Standard Lens Instructions Given and Comparative Tests of Headlight Equipment Which You Can Make

By Robert Livingstone

Though the filament in a headlight bulb is very compact it must not be considered as being equivalent to a mathematical point. This might possibly be implied in our previous articles on the automobile headlight, in which we showed how the angles of light rays reflected from a parabolic reflector are changed when the light comes from different points along the axis.

We have mentioned, for instance, that placing the filament at the "focal point" of a parabolic reflector causes the reflector to throw rays of light that are practically parallel to each other—in other words, a cylindrical beam. This is not strictly true, however, because the filament, no matter how small and compact it may look, is immense as compared with the size of the focal point, for a point is something that has no size at all.

In other words, when we say that the filament is placed at the focal point, we really mean that the filament is placed in such a position that it is as nearly as possible equally distributed around the focal point. Part of the filament must necessarily be behind the focal point, part of it must be ahead, and part of it must be at each side.

Consequently, when the filament is placed at the so-called No. 1 position, at the focal point, the light beam that comes from the reflector—even if the reflector is a perfect parabola—is far from being a true cylinder.

Of course, the beam does contain some parallel rays from the very small part of the filament that does happen to be actually at the focal point, but it is largely made up of spreading rays from all of the parts of the filament that are behind the focus and of crossing rays from all parts of the filament that are in front of the focus.

The illustration shows, in an exaggerated way, what happens to the light under these conditions.

Experience, too, shows that an attempt to place a bulb at the No. 1 position is likely to be discouraging because, if it is done by pointing the headlight at a wall and trying to get the smallest possible spot

of light—the usual method—it will be found that the bulb can be moved quite perceptibly without changing the diameter of the spot of light on the wall. Yet every movement of the bulb changes the relative quantities and the angles of the spreading and the crossing rays that come from the reflector.

The importance of this condition appears both in the designing and installation of headlight lenses. For instance, a lens designed with the mistaken idea that the rays are all parallel as they come from the reflector can not be efficient when used in a headlight that is really throwing its rays in every direction.

Either the headlight would have to be tilted down to eliminate the glare—or, what amounts to the same thing, the prisms would have to be designed to throw the light downward at an excessive angle—or the candlepower of the bulb would have to be reduced. In the first case, the light would be aimed down into the road too close ahead of the car to give a long distance driving light. In the second case, the light would be so weak that it would not be thrown far enough ahead for real safety.

This explains why the official state tests often limit the candlepower of bulbs that may be used with certain lenses, and sometimes require tipping the headlights down in addition, in order not to exceed the glare limit.

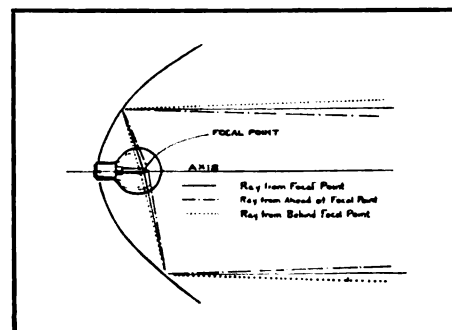
Likewise, in installing a lens that is designed to use the No. 1 position, there is plenty of opportunity for mistake as to what really is the No. 1 position.

It is quite probable that indicating the various focal positions as Nos. 1, 2, 3, and 4 will eventually be discarded, and that instructions for focusing bulbs when lenses are installed will be given by illustrating the pattern of light as thrown on a wall after the lens is installed and the bulb is properly focused for the particular lens.

Such a standardized instruction sheet would have several advantages. It would do away with the error caused by headlights which are so constructed that the

reflector moves with relation to the bulb when the glass front is taken out and replaced.

It would do away with a good deal of the confusion that has been caused by lens manufacturers who have endeavored to mis-



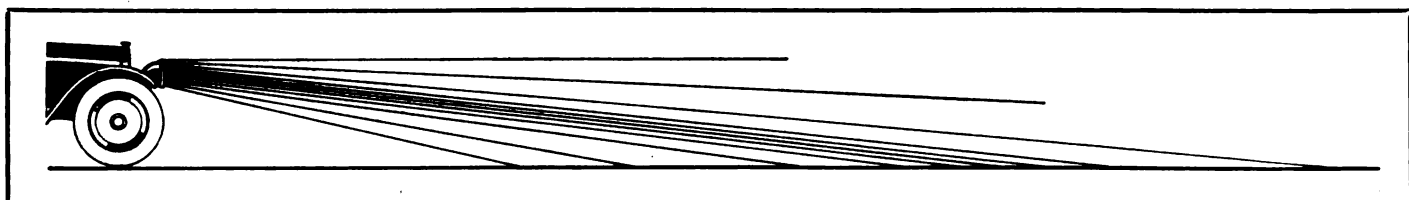
All Rays Are Not Parallel When Bulb Is at Focal Point.

lead the public into believing that their particular focal position was easier to secure than others, or that the arbitrary numbers which were given by the Illuminating Engineering Society were intended to indicate the relative merits of the focal positions which they designated by numbers merely for the convenience of the public.

Most important of all, it would largely eliminate the dissatisfaction that lenses have given to users who did not understand how to get the proper adjustments for the particular lenses they used or who, when the adjustment was merely given by a number, perhaps did not realize the necessity of making any adjustment at all.

It should not be inferred from the last statement that all makes of lenses are equally desirable to use, even when they are adjusted as they were intended to be. There is as much difference between different makes of lenses as there is between different makes of tires or different makes of cars.

Many lenses, even those designed by engineers who have had ample experience in other forms of illumination, have been designed with no other apparent purpose than to secure a not-illegal article that would barely get by the requirements of head-



Light Beam Aimed Downward, Either by Poor Lens or by Tilting Headlights, Runs Into Road Instead of Showing Objects Which Are a Long Distance Ahead.

light laws, and which could be worked onto the public in the excitement that follows the announcement of a headlight law, when people will buy anything that is "legal." Consequently, their effect on the driving light has been far from making a user want to recommend them to his friends.

There are other makes of lenses which are designed with the advantage to the user in view—for the purpose of molding the light from a headlight into a beam which would light the road more efficiently than the cone-shaped beam that comes from a headlight equipped with plain flat glass.

Such a construction automatically takes

care of the glare problem at the same time that it improves the driving light because, in order to get maximum illumination on the road, the rays that start upwardly to be wasted above the level of the headlights must be aimed at the road and used instead of wasted.

"Glare" is nothing more or less than a sign of inefficiency in the use of light—regardless of whether it is allowed to bother other people or whether an attempt is made to stop it by cutting off the upward rays by paint or other light-stopping devices.

A light that glares can never be the best light to drive behind. It may seem better

than the light that comes from an improperly-adjusted or poorly-designed dimming lens, but it is a long way from being as good as a properly controlled and directed light.

For the service man who is not equipped with a light meter, there is only one proof of efficiency from a lighting standpoint—and that is a comparative test anyone can make by placing one make of lens in one headlight of his car, another make in the other, then go out on a dark level road and sit in the car while someone alternately covers up first one headlight and then the other.

Can Advertising Help Small Shop?

Advertising Can Help the Small Town Shopman to a Greater and Better Business—If Properly Applied It Will Repay Every Penny Expended—Man Who Persistently Keeps His Service Before the Public Gets the Dollars

By Allan M. Franklin

When we stop to consider the multitude of things that owe their living to good advertising, it seems reasonable to assume a positive answer to the questions: Why can't advertising help the advantage of the small town shopman? Why can't advertising help him to greater and better business? It can and, properly applied, will repay the shopman every penny expended.

The small town shopman is fortunately away from the active competition that qualifies the shopman in the larger city, but his relation to the automobile business is just as serious, just as important, and will do much to build a lasting, profitable business if he advertises judiciously.

He is in much the same position as the good woman on the fork of the state road in Connecticut who was especially adept at making pies. My, but she made good pies! People in the town knew it, but it was a small town, and if she had started out with the idea of appealing only to the people in her immediate vicinity, she would literally have starved to death despite the fact that she was a good pie maker.

But automobile parties often get hungry, and they used to stop at her nice, clean

**IF YOU HAVE ROAD
TROUBLE ON YOUR WAY
TO JOHNSTOWN STOP AT
JACKSON'S GARAGE,
MIDDLETOWN.**

**Capable Mechanics Who Know
Cars, ready to find your trouble
and stop it.**

**Our charges are based on actual
time necessary to make needed
repairs.**

**We Carry A Complete Line of
Accessories.**

**Jackson's Garage
12 Main Street
Middletown**

Service is the Main Idea.

little place and get a bit of food and a cup of steaming coffee. In a well-placed, clean case, she exhibited great luscious pies, and she served large, attractive pieces of these same pies.

At first, the tourists were content to just eat the pies in her little store. Today they drive to her place just to buy pies, and her business has reached the point where she is independent of the trade in her own town and is reaching out for the pie trade of the two nearest and larger cities. So far as the tourist is concerned, she's getting it.

The same principle applies to the small town shopman. Every tourist has been "stung" good and plenty by the roadside repair-shop. It would almost seem that the repairman figured that he might never see "the bird" again, and resolved that once he had his car in his shop he would make him pay good and plenty for it—and he did. But the tourist never came back. If he had road trouble, he would hobble on, somehow, to the next nearest shop, and he made

it a point to notify his friends on the road of the activities of the "gyp."

This condition has made the motoring public a little suspicious of the small-town shopman, and has served to splatter him with a reputation that he really doesn't deserve. It is true enough that the small town shopman is not alone in this respect—many metropolitan shopmen suffer from the same unsavory reputation, incurred by less principled mechanics.

So, it behooves the shopman to grind his own axe and to take pains to inform the people of his own community, as well as the tourist, that he gives in actual service the same value as the money he asks in exchange. He should make it a point to be courteous, reasonable and business-like in all his dealings, thus living up to the promises that will be made in his advertising when it appears.

Granting, then, that the shopman is thoroughly alive to his job, that he is familiar with cars in general, and has the necessary equipment to make for fairly good service—for the tourist this is especially attractive—then he is in a position to take advantage of the power of advertising.

**BEFORE YOU TAKE YOUR
CAR ON TOUR**

Drop around and let one of our mechanics look it over.

The little time an inspection will take may save you a lot of trouble and inconvenience on the road "a hundred miles from nowhere."

Everything for the motor car.

**Jackson's Garage
12 Main Street
Middletown**

A "Reminder" That Brings Business.

**WHY TAKE A CHANCE
WHEN YOU HAVE
TROUBLE?**

Call around to our shop and we will make the necessary repairs quickly and accurately, and at a slight charge.

Motor car accessories of the dependable kind.

**Jackson's Garage
12 Main Street
Middletown**

How's This for a Good Newspaper Ad?

Every small town has its own newspaper, and the shopman should investigate the rates that are charged for space in these papers and contract for a certain number of insertions during the week or month. After he has passed that stage, it would be well for him to learn something about the rates in force in the newspapers in the towns on both sides of him, and arrange for a certain number of insertions during the busy season—the season when automobiles are on the road.

Such advertising, judiciously conducted, will not cost a great deal of money, and it can be so adjusted that the payments for space will come at times when the shopman can best afford to pay.

Now, then, what to advertise.

There can be no question about the principal subject of the advertisement—service.

The second point to bring out would be price.

We place service first because that is the commodity that the shopman has for sale. It covers his ability to make repairs correctly, and should cover his ability to turn out the repaired car at the hour appointed—not 20 minutes later—not ten minutes earlier, but on the hour.

Price is placed second for the reason that

SOME SCREW DRIVERS HAVE COST THE MOTOR- IST AS MUCH AS \$50.

If you have motor trouble, don't experiment. We pay our men real money to KNOW car troubles and charge you a reasonable price for their expert knowledge.

Better call around and let us take "that knock" out.

Jackson's Garage
12 Main Street
Middletown

Show Motorist Economy of Expert Service.

the motoring public has an inner feeling that every charge the shopman makes is far beyond the actual cost in time and labor anyhow, and that the shopman is simply taking advantage of him because he knows the driver is hardly on speaking acquaintance with his car.

In an out-of-town newspaper, a small advertisement could read as shown in examples given on this page.

These few examples will give you an idea of how to make a profit on your ability to deliver service to the motorist. All of the advertisements can be used in small

space in newspapers, and the cost will probably be surprisingly low.

It is to the advantage of the small-town shopman, when advertising for tourist trade, to give the tourist, in his advertising, the exact location of his shop and to say it so that it will be easy for the motorist to remember it, long after he has read the advertisement.

If the shopman can afford it, it would pay him to have electrotypes made of his advertisements after they have been set in type at the newspaper offices. He then can have the same advertisements reprinted from these on small cards, which he can pass out to his trade, send out with his bills and give to customers to pass on to their friends.

With more and more thought being given to service by the car manufacturer, by the service station manager, and by the car-owner-chauffeur, it is evident that the small-town shopman has an opportunity to put his fingers in the pie and pull out a few plums for himself.

Advertising can be made to pay the small-town shop, without any question, but it is incumbent upon the advertiser to be constantly equal to his advertising and to reflect in real service, the service he has promised through the use of printer's ink.

How to Make the Drill Press Pay

(Concluded from page 21)

drilling holes in glass, use a brass pipe, having an outside diameter equal to the size of the hole required. This pipe should have a peripheral speed of 100 feet per minute.

Use carborundum, 80 to 100 grit, or a valve-grinding compound with oil. This mixture should be placed between the end of the pipe and the glass. The glass must be supported by felt or rubber cushions not much larger than the hole to be drilled. When filing glass use turpentine. Holes up to ½-inch in diameter can be drilled in glass with a flat drill properly hardened. Use a mixture of turpentine and camphor for the lubricant.

Machined spots around a hole on machine frames are provided to give a true flat surface for the head of the screw. This operation is done with the counter-boring tool shown in use in Fig. 18. This tool is provided with a pilot which guides the tool. The size of the counter bore is gaged by the diameter of the surface it will smooth up, and the size of the pilot. This tool has a shank that fits the drill chuck and is driven at about the same speed as a drill of equal size.

Making a Flat Drill to Fit the Job.

It sometimes happens that a hole must be drilled and the proper size drill is not on hand. A shop that is equipped with a forge can make up the size drill required. It is a very common practice for a commercial

shop to make a flat drill to take care of some drilling job that requires special sized drills.

Flat drills must be made from high-carbon steel—the old tooth from the hay rake, tine from a hay fork, and an old

| SIZES OF TAP DRILLS FOR PIPE TAPS | | | | | |
|--------------------------------------|---------------|-------------|---------------|-------------|---------------|
| Size of Tap | Size of Drill | Size of Tap | Size of Drill | Size of Tap | Size of Drill |
| ¼ | ⅝ | ¾ | 1 ⅜ | 2 | 2 ⅜ |
| ⅜ | 1 | 1 | 1 ½ | 2 ½ | 2 ¾ |
| ½ | 1 ⅛ | 1 ¼ | 1 ¾ | 3 | 3 ¼ |

round file are composed of steel that can be made into a flat drill. The stock can be forged to shape, as shown in Fig. 19. Care must be exercised to work the steel at the correct temperature. The diameter of the stock regulates the range of the size drill that can be made.

The newly-forged drill is next filed to size, checking the size with the caliper, as shown in Fig. 20. The angles are the same as those of the twist drill. It will be an advantage to have a twist drill near while working on the job to check the angles and cutting edge during the filing operation.

The next operation is the tempering of the newly-shaped drill. When tempering for steel drilling, heat the drill point to a cherry red and dip in water. Enough heat should be left in the shank of the drill to draw the temper.

The point can be polished with emery cloth, Fig. 21, to make the temper color more visible. Quench when the temper color shows up a light straw. These are the same operations followed when tempering a cold chisel—with the exception of the temper color which is blue.

If a flat drill is used for drilling glass, heat to a cherry red and harden in sulphuric acid.

The drill charts illustrated in this article will be found useful around the drill press and in the shop. This is the type of information that the commercial shopman has around him to help solve his drill-press problems. The charts showing the various drill sizes give the small shop an opportunity to take advantage of this information in handling drill press work.

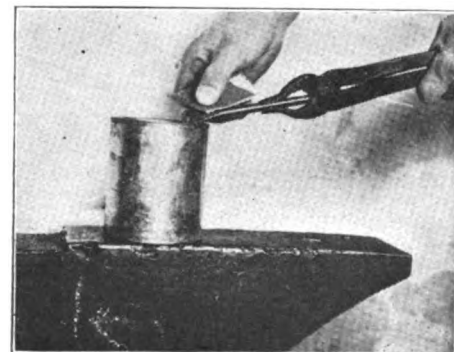


Fig. 21. Hardening and Tempering.

Current Comments and Observations

By The Editor

Interest Precedes Purchasing.

"What was the thing that impressed you the most about the show?" was asked of a man of discriminating taste and practical judgment, who had just been to the Chicago Show.

His reply was just one word, "Prices." Then he went on to comment upon the difference between prices at this year's show and at the shows of recent years. Undoubtedly he laid his finger upon the reason why it was frequently stated during show week that sales records at the Chicago Show were being broken.

Attendance at both the New York and Chicago shows exceeded records of any preceding year. The paid attendance in New York exceeded the 1921 record by 17 per cent, and in Chicago it was approximately 25 per cent.

Naturally, this large attendance denotes an increased interest in motor cars on the part of the public. This interest means that foundations were laid for many sales when the spring buying season really opens.

Interest always precedes purchasing.

Business Better.

The middle of February witnessed a decided bettering in not only of spirit but also in actual business being written—and everyone is confident that the coming of the spring months will see greatly improved business—not a boom but a substantial bettering.

Credit men are compelled to know what the business drift of the country is, and therefore, what they have to say is worth hearing. At the beginning of this month, the situation was summed up by the executive secretary of the National Association of Credit Men as follows:

1. Basic conditions have continued to improve slightly.

2. Production in some commodities is showing improvement. Encouraging indications are displayed in some of the metal industries, pig iron, steel ingots, zinc, tin; and copper mining is showing some promise of revival.

We Just Have to Tell You!

Because it is really "too good to keep." As just a foretaste of the treat we have in store for the readers of the "American Garage & Auto Dealer," we are giving here some of the titles of a new series of articles, publication of which will be commenced shortly, on the general subject of "Tire Repair and Vulcanizing."

Here they are:

"Inner Tubes and Their Repair."

"Construction of Pneumatic Tires."

"Tire Inspection. Methods of Inspecting the Extent of Damage and the Repair Necessary."

"Methods of Cure."

"Fabric Tire Repair."

"Cord Tire Repair. Ordinary Cord and Cable Cord Tires."

"Retreading."

"Care of Tools and Equipment."

"Repair Kinks and Shortcuts."

"Management and Costs in the Repair Shop."

Each phase of tire repairwork will be taken up completely and in detail. The series has been prepared by experts who are thoroughly familiar with all the steps in this type of shop work. Don't miss a single issue!

While the authors have endeavored to make each article complete in itself, the subjects are so closely related that by having and keeping each issue you will, upon completion of the series, have a thorough treatise on the subject of tire repairwork. Watch for the first article of the series! It will appear soon.

Leather manufacturing, car-building and repairing showed slight increases.

3. The cost of living shows a small decline.

4. Employment about neutral

5. Reserves in Federal Reserve banks are moving to high figures which indicates sufficient credit available when demand arises.

6. Increased purchasing power shown on part of salaried people.

7. Business men of the nation are showing grit.

This summary shows a gradual improvement during January, and coincides with the observation of most business men. That we are now definitely on the up-grade is clearly evident.

Motor-Car Stocks.

Early this month there was an upturn in motor stocks listed on the New York stock exchange and also in the accessory stocks which will directly benefit by better business conditions in the industry. This improvement in the stock market was explained as a reflection of the success of the Chicago show.

During the first few days of the New York show, sales of cars held up very well. The last few days of that show were disappointing, mainly because of a mysterious cut, scheduled to be announced later by Dodge Brothers & Co., but the extent of which was not generally known at the time. Between the interval of the New York show and the Chicago show this cut was announced, and it was about one-half of what had been generally anticipated. Later the Ford Motor Co. cut its prices—but the cut was small indicating to the buying public that Ford prices are now pretty well stabilized.

With these developments out of the way, the Chicago show started auspiciously. The show broke several records. More cars were sold than at any previous automobile show. More cars were sold, too, than at the New York show.

Executives of the motor-car corporations profess enthusiasm about the result, and with the return of spring and the opening of the roads, predict resumption of selling activity.

A Business Built Upon Service

This Nebraska Repairman Took Stock of His Success—Building Materials and Found that Service Was Most Unlimited and Inexpensive Material Available and Then He Made a "New Year's Resolution"—Now Read What Happened

By J. N. Bagley

There is a story of a certain famous bluebird that was found perched serenely at home after its seekers had circled the globe in search of it. That story reminds me of another. I will tell you of R. M. Van Gilder and the business which he built upon service.

It was my fortune to spend the winter of 1910 in the little city of Hastings, Neb., where Van Gilder kept a small repairship and smithy. Van was one of those happy-go-lucky fellows who take life easy. Now life resents being taken easily and shows her resentment by consigning those who take her that way to oblivion. She had Van about half-consigned.

It was tradition in Hastings that when you took anything to Van's shop to be repaired, you would get the finished job when the spirit moved Van and not before. His fellow-citizens joked Van about this, but Van did not care. He made a modest living for himself and family and, most of the time, had a few dollars in the bank.

Then something woke Van up. It was an article in a little booklet and its title was: "You can if you will. But will you?" It told how the material of which success is built is lying at the hand of every man, and whether a man achieves success or not depends upon whether he will apply himself to its construction.

Now Van had never thought of success as being built. He had always considered success as something unexplainable. It just happened. A man woke up some morning and found the bank was full of money that belonged to him, the customers stood in lines before his place of business, his employees worked overtime and success had arrived.

Such had been Van's conception of suc-



R. M. Van Gilder's Plant, Hastings, Neb.—Fulfillment of Resolve to "Create" Success.

cess, but it now dawned upon him that it might be the result of effort such as any man might put forth if he would. He read the article again and became convinced that this was a fact. Van laid the booklet down and began an invoice of the material with which he might set about building his own success.

He finally decided that the most unlimited and inexpensive essential was service. Van's eye fell on the calendar. It was December 31. He grinned—but there was purpose written on his face as he said to himself: "Here is where I make a New Year's resolution—and keep it. From this day on my middle name is service."

With the coming of the new year, Van handed the natives of Hastings a jolt. His doors were open at seven o'clock every morning and the sound of his industry could often be heard until after the curfew.

One merchant took the wheel of his delivery wagon to Van to be repaired, saying: "Fix it as soon as you can because we need

it badly." "All right," said Van, "I'll fix it in a jiffy." Now Van had always made that promise and the merchant returned to his store hoping that Van would at least have the wheel ready in a couple of days. Twenty minutes later Van looked in at the back door of the merchant's place of business. "I'll put that wheel on your wagon, if you will tell me where you keep your grease," he said. "The spindle is dry."

"I guess we are out of grease," said the merchant.

"Shall I bring you over a box?" asked Van.

Van sold the grease and the astonished merchant told the story to everyone who came in that day. The town rubbed its eyes and watched Van's "dust."

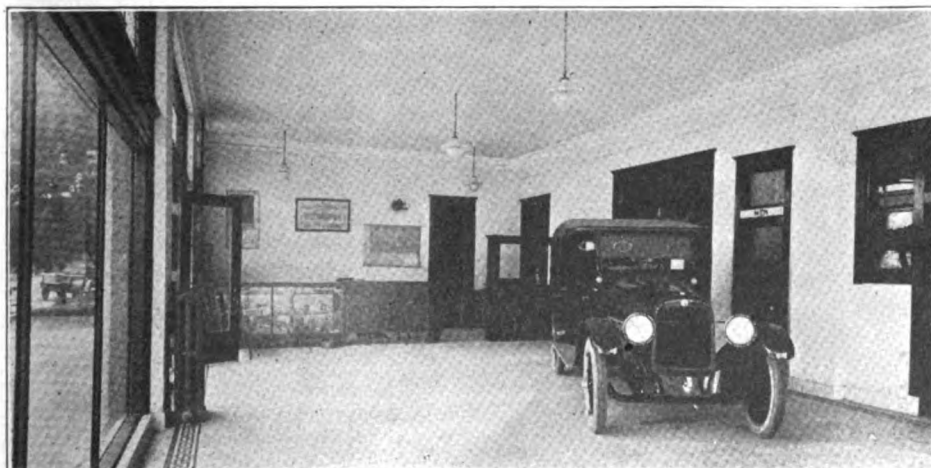
When you drove up to Van's place of business you did not have to go in—Van came out. When he promised to have a piece of work done, it was ready at the designated time. If you were in a hurry, Van brought it to you the moment it was finished. The inside of Van's shop, which, in the past, had resembled a cross between a Chinese puzzle and a junk heap, became a model of cleanliness and order.

The postmaster came past one morning and noticed that Van was wearing clean jumpers over his good clothes. He also had on a white collar and a tie. The postmaster inquired where Van was going to preach, but Van laughed and said: "If you and the grocer and the butcher can present a respectable appearance at your work, why not I?"

"Oh, that is different," said the postmaster. "We have a business."

"You watch my smoke," Van called after him, "I'll make you fellows think business."

I left Hastings in February and, as I started on my automobile trip to another



Attractive Neatness and Order of This Salesroom Typical of All Van Gilder's Departments.

part of the state, I drew up in front of Van's place for some gasoline. Van was on the job with his "at your service" attitude. He gave me the desired gasoline and filled the radiator for me. He looked at my oil and asked: "Going far?"

"About 60 miles," I answered.

"You will need more oil in about 25 miles," he said.

As I thanked him for the information, he was looking over my tires. "Have you a spare tire and a good pump?" he asked.

I had neither and said so.

"Better buy them now, then," said Van; "it will beat walking a mile or so to a telephone and waiting an hour for them to be brought to you."

I bought them and, as I was strapping the spare tire to my car, a tourist drove up. He wanted gasoline and information concerning the road ahead. Van gave him both and filled the radiator of his car for him. Then he said: "If you will wait a moment, friend, I will pump up that right front tire for you. I see it is low."

Van tested and filled the tires and, as the tourist thanked him, he said: "When you apply your brakes, friend, do it carefully or you may overturn your car. The lining is completely gone from the one on the right side."

"The devil!" ejaculated the tourist; "I don't want to travel over strange roads with brakes in that condition. Let me see."

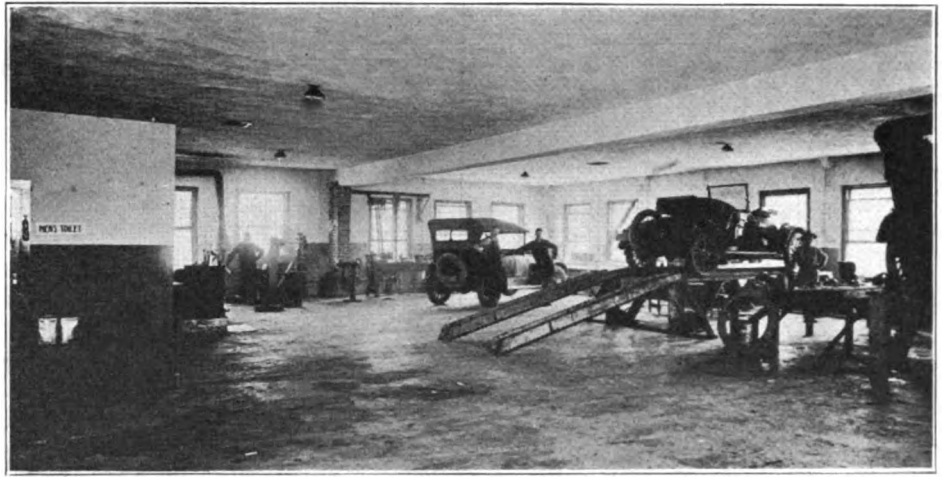
Van pointed out the defective brake. "How long will it take you to reline that?" asked the tourist.

"Not very long," replied Van.

"All right, fix it," said the tourist.

I did not wait to see how much more business Van did with the stranger, but I will venture that, no matter how much of his money the stranger left with Van, he did not regret it.

I was interested in Van and kept track of him. The other day I visited his place of business on the corner of Third and Denver streets in Hastings, and was shown through one of the largest and best-equipped plants of its kind in the country. I noticed that the shelves of the stockroom were filled



A Section of Van Gilder's Well-Lighted and Arranged Repair Department.

with the leading brands of merchandise and remarked about it.

"Yes," said Van, "I used to keep a lot of pirate parts and job lots of goods made to be sold—not to serve—but one day I woke up to the fact that men do not spend thousands of hard-earned dollars to advertise goods that do not possess the merit to maintain the foothold the advertising gives them. So I cleaned house and a junk dealer got the junk. I won't even try to estimate the good that house-cleaning did my business."

Van has inoculated his employees with the spirit of "service first, last and always" that has made his success.

I noticed the old slogan of which Van is so fond: "You Can if You Will. But Will You?" posted conspicuously in every department of his plant.

Van rewards the alertness and interest of his employees in the business with substantial raises in salaries and vacations on pay.

Eleven years have passed since Van made his resolution to cast aside his old slipshod methods. The plant now occupied by his business stands as mute testimony of how well he has kept it. He has established a widespread reputation for prompt and efficient service, and his methods of doing business are excelled by few and respected by all having occasion to use his service.

There are few better examples for the business man or employe of today than that of R. M. Van Gilder, who—when he discovered that success was not an accident but a creation—went to work and created it.

Some Facts Regarding Automotive Industry in France.

The following salient points are brought out in a report from Commercial Attache W. C. Huntington, at Paris, under date of December 8, 1921, giving detailed information regarding the French automobile industry:

Prices of motor cars in the French market have dropped, but are now well stabilized. However, the prices of French cars are high; even those of the newly developed 10-horsepower vehicles run from \$1,000 to \$2,000 at the present rate of exchange, which is at least twice the cost of a car of equal utility in America.

The automobile in France, until recently, has been little democratized; most car owners employ chauffeurs, which accounts for the relatively slow introduction of electric lighting and starting. However, at the present moment many more Frenchmen are driving their own cars, owing to the business depression.

The number of individual manufacturers has greatly increased from 48 before the war to 60 after the armistice. At present they are working at only 20 per cent of capacity and are turning out 53,000 cars per annum, as against a production capacity of 250,000. The eight-hour law, now in effect in France, necessitates an average of one year's working time of one man for the production of a chassis, which is evidenced by the fact that for 53,000 cars per annum 55,000 men are employed in the manufacture of chassis and parts, 15,000 on body work, and 10,000 on accessories, or a total of 80,000 men.

This report may be obtained by applying to the Automotive Division, Bureau of Foreign and Domestic Commerce, Washington, D. C., requesting Exhibit No. 511.



Van Gilder's Service Floor a Splendid Example of Lighting and Systematic Planning.

Some Business-Stimulating Ideas

Kentucky Agency Finds Good Publicity Sells the Cars—Sample Pump Displayed Where Customer Can See and Test It Aids Pump Sales—Value of Being Alert to Every Chance Shown in Clever Selling Stunts Used by Dealers

Live Advertisers.

The Landrum Brothers agency in Louisville, Ky., which sells the Hanson Six car, is a strong believer in the value of publicity.

It has recently been featuring the price reductions made by the Hanson company, and its advertising has run all the way from hand bills printed in three colors of ink and distributed throughout the residence section of the city to a jazz band which paraded the downtown streets of Louisville with huge posters advertising the cut in prices. The firm also carried full page advertisements in local newspapers.

A Thought On Pump-Selling.

Any salesman, who has watched the manner of buying employed by car-owners who are looking at tire pumps, will have noticed that they must take the pump to the floor and begin pumping. It is as natural as is the habit of men to feel the cloth of a suit, even if they do not know the first thing about fabrics. The clothier finds that it is well to let the customer feel the cloth.

Cashing in on this habit, one dealer in accessories has made use of his study of human nature. It has brought success to his department.

One of each kind of pump that he stocks is displayed on the front of his counter, a special uncovered case being made there. He has seen dozens of men come that way and, apparently without having come in to buy a pump, pull one off the hooks that held it and begin to try it. An inquiry or two, a comparison, and many pumps have been sold to men who might have gone along "making the old one do."

His stock is back of the counter, displayed on regular display doors, but this display gets the goods and the customer together very quickly.

Another wrinkle that has meant much to him is his system of putting the samples on the display doors. In the average store the goods in stock are behind the door on which they are shown. Not so in this store. The goods shown on one door will be behind the door next to it, and vice versa. Thus, when a salesman is getting out the article for a look-at, he does not interfere with the customer's view, as would be the case in a store of the usual arrangement. It is a little detail that helps.

Strangely, the display doors of this man's place seem to indicate that his stock is always full—a point in his favor when showing goods. There is a simple way of arriving at this result.

When a certain accessory is sold out, down to the one on the display door, or when a certain size is gone, the space for-

merly occupied by the sample is not left bare. A duplicate of one of the samples already on the door is brought out and used to fill the space. It does not interfere at all and gives the appearance mentioned with profitable results.

Some Clever Selling Stunts.

By taking advantage of circumstances that are presented, more than one resourceful dealer has gotten the need for his goods before prospective buyers of cars—commercial or passenger.

An industrial parade, in which the various commercial firms would be represented with trucks on which were floats advertising their respective businesses, was planned in a western city. A dealer in motor trucks figured that every other truck dealer would show his modern methods of transporting goods. He decided to do the thing differently.

He hunted about the town until he located a light delivery wagon that was about ready to fall to pieces. He bought it outright and transposed a rear wheel and a front wheel at opposite corners of the rig.

When the wagon moved it went at a wobbly, uneven gait, due to the fact that the wheels were not paired. Added to the effect was the weatherbeaten and damaged condition of the outfit. He secured a horse that was in keeping with the rig. Thus, when people looked at the parade of shining, modern outfits they beheld one incongruous unit.

The old delivery wagon had this sign on the sides:

Funny Sight, Eh?

Nothing funny trying to do a BIG business on a SMALL expense with antiquated equipment. Let us show you the figures on a M—— Truck.

Following this wagon was one of the trucks thus advertised, and it was properly labeled not only with a sign but with the trade-marks of well-known local users. The outfit created quite a bit of attention and the contrast focused attention on the truck.

In the Northwest is a furniture concern that is doing a big business in the country. At one time it did not handle this country business, as it was hit hard with mail-order competition. Farmers in that section would order by catalog, have the goods shipped in by freight, and then haul them home.

One day a local automobile dealer noticed such a shipment going to a home. Later he heard the buyer complaining of the difficulty he was having in setting up some of

the furniture and a range. From this the dealer got an idea. He thought it over and then hastened to the local furniture man with a suggestion.

The result was a truck, for the furniture man had enough vision, after the proposition was put up to him, to give it a trial. He bought a truck. Now his strongest selling talk to country people is that he can send their goods right out to their homes and set them up—thus saving them not only freight and hauling but the disagreeable, if not difficult, task of uncrating and setting up. He now sends goods on regular deliveries in several directions and has even obtained out-of-town business in communities that he had never before touched.

This sounds like a talk to furniture men but, if it is not being used in an automobile dealer's city, it applies with equal importance to the automobile dealer's business.

Sometimes a tie-up with another dealer will be possible. It is not likely that one such as a Missouri dealer used will come to another town, but it will serve to indicate the value of being alert to a chance.

A phonograph dealer received a large shipment—two cars—of his instruments when the fall selling season opened. He casually remarked that he would like to show them off.

"I'll make you an offer," said the motor dealer to whom he was talking in a restaurant. "Make a parade of them! I'll furnish the trucks and signs for my motors if you'll pay the drivers and make your signs! How about it?"

"You're on!" answered the music dealer.

The result was that there left the freight dock a string of motors—some new and some rented—each loaded with cases of phonographs. The music dealer had his placard on each side of a sign that stood on top of each load. The truck dealer had his sign along the side of each truck. The parade passed through both business and residential districts. It was helpful both to the truck dealer and the music dealer.

Country schools which, in many communities, are as fine as town schools—thanks to several districts combining funds—furnish prospects for truck dealers in some cities. Patrons of the schools, in order to have the better schools and better staffs and equipment, locate the school in a central location of the country districts and then each district buys a truck with a special body to transport the children to and from the schools. Such plans, when learned in advance by dealers, furnish prospects.

Removing the Sticker.

"Yes, we would keep a car if it wasn't for the operating expense. Gasolene and oil are so expensive these days, you know. An automobile is really a luxury."

It is a remark containing these ideas that many an automobile distributor has to meet and dissipate before he can say: "Oh, boy! Sold another one!"

F. H. Johnson, Oakland distributor, of Sacramento, Calif., who deals in used cars, meets the issue successfully in this way: He reasons that, if he can get the would-be purchaser to use a car for awhile and find out how difficult it is to get along without one after that, the bugaboo of operating expenses will not "cut much ice" in the purchaser's keeping the car.

Therefore, he eliminates the operating expenses for the purchaser and convinces him that the automobile has ceased to be a luxury. For six months he pays for the purchaser's gasolene and oil. After that, of course, the purchaser naturally deems the automobile a necessity and "pays his own" willingly.

The idea is something like one of those tickets you can buy in Belgium at a fixed price and travel on for a month as often as you please and to any part of the kingdom.

Unique Automobile Sales "Stunt."

The Barnes Motor Co., of Cleveland, Ohio, has adopted a very unique and novel idea for disposing of second-hand machines, which might profitably be emulated by other dealers.

Each week this firm offers one of its second-hand machines to the highest bidder. The machine selected for the sale is extensively advertised through the columns of the local papers, the advertisement giving a complete description of the car, the extent of the work done on it, and also stating at what figure the company values the car. It then announces that the car will be awarded for the highest bid received up to a certain hour upon a certain day, and that bids will be received on the car up to the time set for awarding the car to the highest bidder. In connection with the advertisement, a special form is run which the bidder may use in sending in a bid.

The car is on display at the company's display room and prospective bidders are asked to call and inspect the car.

Not only does this plan sell cars but it also puts the dealer in touch with a large number of prospective buyers on whom he might not otherwise get a line.

The uniqueness and novelty of the plan should prove a real factor in attracting considerable attention, and prove of special value to the dealer in furthering the goodwill of his firm as well as being a successful selling stunt.

Advertises in "Movie" Theater.

Pearson Bros.' Charter House Garage, Media, Pa., has a neat display room with two good show windows which it keeps attractively dressed. It has prominent

signs on both building and windows. It maintains an "open air" as well as a fully-equipped repairshop. Neat cards—stating its business departments—are handed out to all "stop-in" prospects, and it advertises in the newspapers. But the management considers that its most successful form of publicity is in the advertising messages which are thrown on the screen nightly at the motion-picture theater next door.

Here some special feature of the garage's sales or service department is singled out for the "movie" advertisement. One night some such message as the following may appear:

EMPIRE TIRES CAN'T SCORE—
GET 'EM AT
PEARSON BROS.' CHARTER
HOUSE GARAGE

The following night this may be the tidings:

OVERHAULING, WELDING,
MACHINE WORK
DONE PROPERLY AT
PEARSON BROS.' CHARTER
HOUSE GARAGE
211-213 West State Street

And the next night this may be wigwagged:

FORD PARTS, EMPIRE TIRES
AND ACCESSORIES
AT
PEARSON BROS.' CHARTER
HOUSE GARAGE

Pearson Bros. always make the point of using the garage's full name, "Charter House," because there is another garage concern in town which has a name similar to their own—Pierson—with a difference in the spelling. The garage takes its name from the borough's main hotel next door—the Charter House.

The screen messages are always brief, as indicated, as the Pearsons fully realize that nothing bores a motion-picture audience more than a lengthy advertising text on the screen when they are waiting for the next picture showing an incident in "That Night," or whatever it may happen to be.

The garage services commercial as well as passenger cars, and its shop has heavy as well as light machinery for making repairs. Display boards in the windows help to attract customers.

The Pearson brothers are always on the alert to make a sale. For instance, one of them recently saw a couple of tourists vain-

ly struggling to tie some unwieldy luggage to their car, which they had stopped across the street. This brother dashed out and in less than three minutes had sold them a luggage-carrier.

"Jacks."

A selling "stunt", which was recently put into effect by a certain automobile accessory dealer located in Grand Rapids, Mich., was most effective in attracting attention and, while it was used in one of the large cities, it is easily adaptable for use in the smaller towns.

This stunt, which had most of the pedestrians who passed the store stopped, consisted of a clever window display. In the foreground close to the glass was a good imitation of a sidewalk. On each side of the walk was a green carpet of pseudo grass.

Sitting on the edge of the walk were two life-size dolls, clad naturally in the everyday clothes of the typical little girl. In the hand of one of the "girls" reposed a rubber ball. Below her outstretched hand on the sidewalk was a group of those small-pronged toys which little girls love to play with called "jacks."

The inference drawn from the scene was that the little "girl" holding the rubber ball was just in the act of bounding it on the sidewalk, while the second little "girl" seemed much interested in the progress of the game. The background of this display was, of course, a solid tier of the regulation automobile jacks. Above the display was a sign with a single word inscribed upon it—"Jacks."

This display, which had everybody looking at it, was easily staged and can be made equally as effective in the smaller cities as it was in Grand Rapids. The natural interest that almost everyone has in children, the play on the word "jacks," and the clever arrangement of the figures catches the attention of nearly every passer-by.

Free Estimates Turned the Trick.

"WE GIVE ESTIMATES FREE OF CHARGE."

There's a talking point for you, Mr. Garage and Repairman!

And that's the talking point used with great success by the Krauskopf Auto Co., of Fort Wayne, Ind., in getting more repairwork and in getting more people into the garage where they can be shown the cars handled by this garage and where sales can, therefore, be more easily made.

This concern also adds these sentences to those advertisements in which it plays up the splendid selling phrase quoted above:

"We will tell you just what it costs to have your cylinders re-bored and new pistons fitted. We also guarantee all of our work to be satisfactory or money will be refunded to you."

Doesn't this contain some good suggestions for other garages and dealers?

Welding, Cutting and Brazing Practice

Regulator Valve Cuts Down Source Pressure to Pressures Required for Flame Sizes—Its Operation and Care—Two Types of Regulator Gages, Both Precision Instruments and Acting as Safety Signals to the Torch Operator

By David Baxter

In preceding chapters the nature and care of tanked oxygen and acetylene and the acetylene generating plant used in oxy-acetylene welding and cutting have been discussed. We saw that any one of the three carried a heavier pressure than is utilized by the common welding torch.

Therefore, it should be obvious that there must be some way to reduce this high pressure to a lower or working pressure. And that, to keep the flame steady, there must be some method of controlling the reduced pressure. The working pressure must be constant to prevent the flame from fluctuating, in order to obtain the best results in welding.

For this purpose, the regulator or reducing valve was devised. Primarily intended for the purpose of reducing the pressure at its source, it was then called the reducing valve. Now since the more modern apparatus also keeps the working pressure constant and even, it is commonly known as the regulator.

This valve is interposed between the tank, or the source of gas supply, and the welding torch, also, the other gas-operated tools which the oxy-acetylene welder employs. Its duty is to cut down the source pressure to the various pressures required for the different flame sizes. Without it welding would be a complicated and perhaps a dangerous proceeding.

Ordinarily, there is a separate regulator for each welding element. One is made ex-

pressly for oxygen and one for acetylene. Usually it is better to have a special cutting regulator if thick metal is to be cut. For ordinary light cutting the welding oxygen regulator can be employed. A general description of one type, however, should suffice here, as they all operate on practically the same principle. In fact, there are quite a number of different styles of each regulator on the market at present, all of which follow the same fundamental theory. Therefore, a discussion of one should furnish sufficient instruction for all.

In a few words, the principle upon which the welding regulator operates is that of a disk, or diaphragm, of metal or rubber composition interposed between the release screw and the tank pressure.

When this screw is tightened, it opens the gas inlet and permits the gas to enter the body of the valve. When this pressure gets strong enough to overcome the tension of the screw, it pushes the diaphragm outward and cuts down the incoming gas. Then, as the gas is consumed by the welding flame, the diaphragm and screw react again to open the gas inlet and permit more gas to enter the regulator.

Thus it will be seen that the diaphragm is continually moving in and out as the welding proceeds. However, if everything is in good order, this movement is so gradual that it is almost imperceptible—almost like the action of the human lungs. By the time the gas reaches the torch, the fluctuation is dissipated and the flame burns steadily.

On the other hand, as the tension screw is loosened, the inlet is gradually closed until the desired low pressure is attained. But it is readily perceivable that this constant movement will finally wear out the interior parts of the regulator, particularly the diaphragm and the seat of the inlet nozzle—the latter being that part of the valve which presses against the nozzle to shut off the gas.

This seat is usually constructed of what is termed "ebonite." The constant opening and closing of the inlet tends to wear this seat out in time. If the pressure is changed suddenly or carelessly, the damage to the seat is considerably more. In fact, the seat does not have to pound very many times to injure it beyond use.

A leaky, undependable regulator is the effect of a damaged nozzle or seat. The regulator is also inaccurate after the constant movement has decreased the resiliency of the diaphragm and its compensating springs, two of which are usually coiled

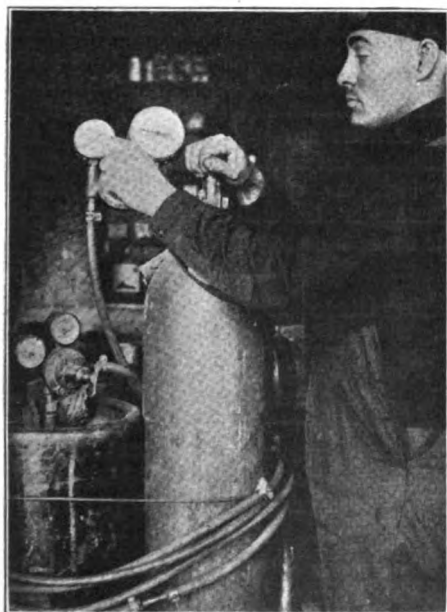
around the thumbscrew and one back of the valve-seat.

One instance of careless handling of the regulator is where the operator opens the tank-valve while there is a tension on the springs—that is, opening the tank-valve suddenly while the diaphragm is screwed down. Not only is the regulator seat injured, but the diaphragm itself may be put out of commission by the sudden increase in pressure. On the other hand, both may be injured by a sudden reducing from a high to a lower pressure.

Say the operator is using a 15-pound pressure and it becomes necessary to change to three pounds. If the thumbscrew is backed out suddenly, there will be so sudden a decrease in the resistance of the diaphragm that it will be forced outward and in time will become so buckled that it is inaccurate if not worthless. In any event, if the welder is not familiar with the parts, he should return the regulator to the manufacturer instead of attempting to make repairs himself.

Before going deeper into the use and care of the reducing regulator, it is probably better to discuss the welding gages to some extent, as they are so closely related that one is useless without the other.

Responsible manufacturers of welding outfits equip all of their types of regulators with two gages each—one of which is a



Release Regulator Screw With Left Hand and Open Tank Valve Gradually With Right Hand.



Be Sure Regulator Connection Fits Squarely in Tank Socket When You Are Tightening the Union.

3,000-pound gage and the other ranging from 50 to 150 pounds. The former usually reads not only in pounds pressure, but also in cubic feet. So, by glancing at this gage, the operator can instantly note both the pressure of the tank and its cubic content. The other, which is usually the smaller of the two, indicates the pressure under which the torch is operating.

The larger gage might well be called the tank or high-pressure gage, since it has only to do with the high pressure of the tank. It is connected directly to the high pressure and, therefore, is somewhat liable to damage if the full pressure is turned on suddenly.

The smaller gage might aptly be termed the reducing gage since it indicates the pressure after it has been reduced by the regulator; or it can be remembered as the regulator gage, as it is connected to the body of this valve. It is also in danger of damage by the same treatment accorded the regulator.

Both gages are instruments of precision, and should be treated accordingly. In a way, they are safety signals to the torch operator and, when they are rendered defective or inaccurate, should not be depended upon. In the event of derangement through mishandling or wear, these gages should be exchanged for new ones, as it is practically impossible for the average welder to repair them.

The low-pressure gage is an index of regulator trouble—it warns the operator when the regulator is getting out of order. So it may not always be the fault of the gage when its registration is seemingly wrong. The regulator should be examined before condemning the gage.

If the glass gets cracked or broken, it should be replaced immediately, as this soon leads to a defective gage. Moisture, dust, or gas work adversely upon the interior parts and more rapidly if allowed a free entry by the broken glass.

Like nearly all other parts of the welding apparatus, oil should be kept away from gages and regulators. No oil should be applied and, if any is present on new equipment, it should be entirely removed before the device is put into service. While there is not always danger of explosion, there is ever present the menace of spontaneous internal combustion. Instances are recorded where the whole inside workings of the regulator and its gage were burned to worthlessness.

After a regulator has been in service for some time, it tends to "creep." This is caused by the seat not closing against the nozzle as it should and allowing the gas to enter the body of the valve to more than the desired pressure. This condition is denoted by the action of the reducing gage, which continues to register after the thumbscrew has been set.

With the valves on the torch closed, the gage hand does not remain stationary, but gradually indicates higher pressure than it

did while the torch was burning. An increase of a few pounds is really immaterial, but when the pressure continues to creep 5 to 20 pounds beyond the working pressure, the regulator should be repaired or dis-



Hold Regulator in Vise While Attaching Hose to Avoid Danger of Springing Valve Connection.

carded, as there is risk of bursting the diaphragm or the gage.

If the operator is fairly skillful, and is familiar with his particular regulator, he can replace the defective seat. In some makes of reducer, he has merely to turn the seat over and use the other side. If both sides are worn, it means a new seat.

It is not advisable to make a new seat unless the operator knows how to do it. It is better to keep extra seats on hand.

Some judgment is essential in adjusting the new seat for it must fit against the nozzle accurately. In some types of machine, it is necessary to put some thin material like paper back of the seat. In others, it is necessary to screw the seat closer to the outlet nozzle. At any rate, it is imperative that the seat shall lie in contact with the nozzle when the spring tension is released. Then no gas can pass through the regulator until the thumbscrew is backed out.

All of this brings out a simple rule to follow: Have the thumbscrew backed out when turning on the gas and then turn the pressure on gradually—both to protect the tank gage and in the event of carelessness.

Finally, some care should be exercised in attaching the regulator valve to the outlet of the tank-valve. It should be held squarely in place while screwing it into the socket, in order to prevent the stripping of the threads. The connecting tube of the regulator should not be screwed too tightly against the seat of the tank outlet, as the machined surface of it may be damaged thereby. However, the connection must be tight enough to prevent leakage. A heavy wrench is never necessary.

The hose connection is probably the last operation. It should be secure and should

never be carelessly done. The hose must not slip off nor leak, as it may be the cause of a bad burn on some workman or a disastrous fire and explosion.

If the hose is fastened on the valve connection while it is in place on the tank, care must be taken to see that the tube of the regulator is not bent or twisted sideways. Perhaps the best procedure is to remove the regulator outfit from the tank and fasten it in a vise while attaching the hose. The vise is also a good thing to utilize when making other repairs on the gages or reducer. There is no danger then of causing an accident.

We have now covered the subject of gages and regulators with fair thoroughness, and will pass on to other elements of the oxy-acetylene welding business in future chapters, after repeating the warning that regulators differ in design and construction according to the ideas of the various manufacturers.

In the main, the instructions given here cover the subject in such a way that we can readily grasp the working theory of other outfits. With the aid of the manufacturer's printed instructions, the novice should now be able to work out the handling of any make of gage or regulator.

REGULATING THE GENERATOR'S OUTPUT.

(Concluded from page 15.)

ings and a set of contacts which are normally closed. The voltage coil consists of a large number of turns of fine copper wire, connected directly across the main generator circuit—that is, in parallel.

Another coil—a reversed winding—consists of a large number of turns of fine wire around the core in the opposite direction to the voltage winding. The last winding is a non-inductive coil, having half of the turns wound in each direction around the core. The reverse and non-inductive windings are in parallel with the contacts and add resistance to the field circuit when the contacts are open. This prevents the generator output from becoming too great at high car speeds. The non-inductive winding is also used to prevent arcing at the contacts or regulator points.

Ohio State Highway Department Starts Road Marking.

Work has been started by the Ohio State Highway Department in marking all of the main traveled highways in the state. All important east-west state roads will be marked with red stripes, north-south roads with blue stripes, and diagonal roads with yellow stripes.

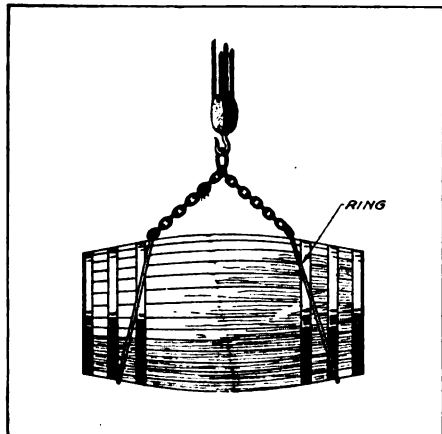
The State Highway Department will not do any painting along the Lincoln Highway, as the Lincoln Highway Association has taken proper care of that route in a permanent manner, without expense to the state.

Practical Hints for Shop Mechanics

Handling Oil Barrels.

By having a tackle made as shown in the illustration, it will be an easy matter to handle the filled oil barrels as they must be emptied into the service tank.

Take two steel rods of $\frac{1}{2}$ -inch iron and weld into two rings of a size to fit over the ends of the oil barrels as shown. Connect these rings with a piece of chain about 20 inches long and fitted with a ring in the



Tackle Handles Filled Oil Barrels Easily.

center, into which the chain hoist may be hooked.

Slip the tackle on a barrel, then insert the faucet and, by hoisting above the service tank, the oil may be easily drained from the barrel.—R. W. T., Mo.

* * *

Improved Carburetor Testing Can.

A recent issue of the AMERICAN GARAGE & AUTO DEALER showed a carburetor test can made from a gallon bucket. No cut-off was in the gasoline line, which means that the gasoline must be emptied before the connection is removed from the carburetor.

Instead of using an open bucket, take a half-gallon varnish can and solder a piece of copper gasoline tubing to the bottom of the can. Fit a small Globe valve to the line and then a short piece of tubing with a carburetor connection. When through testing, turn the valve closed and the affair is ready for another time; also, the cork may be kept in the can which will prevent evaporation of the gasoline.—M. B. G., Tenn.

* * *

Carbon Kink.

When ready to replace a cylinder head, after scraping out the carbon, some means must be employed to remove the carbon from the bolt holes, or else there is danger of twisting some of the bolts off in trying to turn them clear down.

Some men use a drill bit, which is a good idea when the carbon is packed, but usually

it is loose enough to be blown out by air pressure obtained by making a hose connection with the air line. Also this method is much quicker.—L. J. S., Mo.

* * *

Saving Worn Piston Pins.

Worn or undersize piston pins are usually discarded, but this is not necessary if the workman cares to expand them. When in a hurry or working on a motor for which parts cannot be obtained, the expanding is often very convenient.

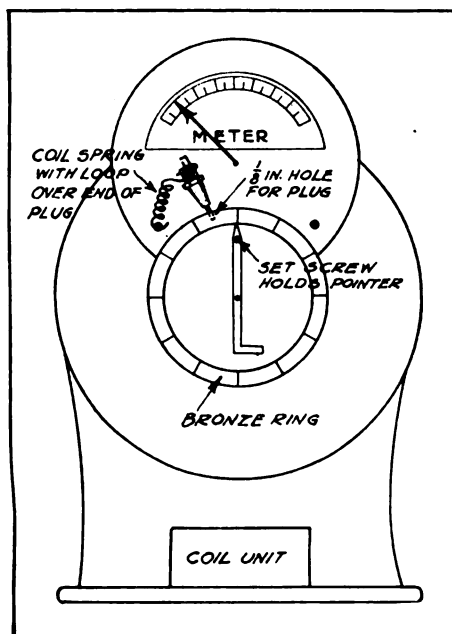
A special punch should be made that has a section which is several thousandths larger than the hole in the pin. After the pin has been heated to a bright red, the punch should be driven through the pin with a few sharp blows. Then the pin should be case-hardened and ground to size.—E. S. R., Mich.

* * *

A Good Spark-Plug Tester.

Most Ford service stations have a combination coil unit and magneto testing device similar to that shown in the illustration. We make a good spark-plug tester of ours also.

A $\frac{1}{8}$ -inch hole is drilled in the bronze ring as shown, the gap on the plug being increased to about $\frac{1}{8}$ -inch, and the space



Coil Unit Device Makes Spark-Plug Tester.

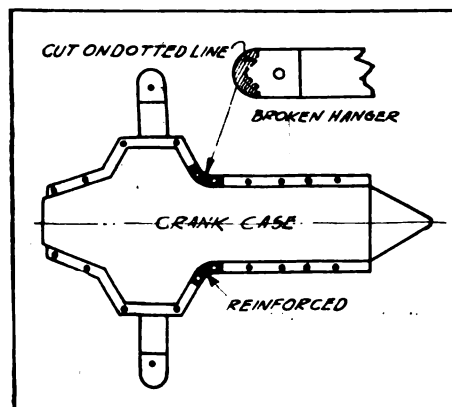
between the bronze ring and the pointer increased to $\frac{1}{8}$ -inch.

Now, with the coil unit in place, you can find any short in the plug. If a good steady spark shows at the points and none down inside the plug, it is O. K.—A. A. W., Wash.

Reinforcing Crankcase.

An old crankcase is always broken in the corners where the block and transmission joins.

Remove the broken hanger from the crankcase, and cut as shown in the illustration—along the dotted lines. They will just



Prevents Broken Crankcase Corners.

fit into the corner of the case. Braze them on and drill a hole through. This guarantees against breaking.—C. A. M., N. Dakota.

* * *

The Leaky Carburetor.

Considerable difficulty is often encountered in the average shop with leaky carburetors. It is more or less difficult to determine whether or not the needle valve will leak unless some testing device is at hand.

A small tank, partly filled with gasoline and equipped with a pressure gage and hand pump can be connected to the carburetor and a quick test made.

Needle valves may not leak when tested with gravity, but will leak badly when tested at three or four pounds' pressure.—G. E., Cal.

* * *

Prevents Casings Rusting to Rims.

Casings quite frequently rust to their rims, causing considerable trouble when their removal is attempted. There are two satisfactory methods of preventing this. A strip of heavy paper may be cut to fit the width and circumference of the rim and shellaced firmly into place.

Perhaps a better method is to secure an old inner tube several sizes smaller than the one used on the wheel. From this cut a rubber band of such a width that it fits snugly on the rim. The tube chosen should be small enough that the band is stretched tightly when placed on the rim. Either of these methods provides cheap insurance against the tire casings rusting to the rim.—L. R. B., Iowa.

Power-Operated Doors.

I had charge of the shops in a large automobile service station in New York City. We had room for 140 cars and, as our shops were filled most of the time with au-

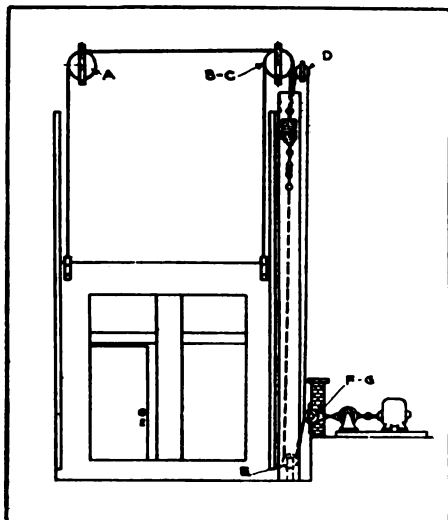


Diagram Showing Method of Construction, of Power-Operated Doors.

tomobiles in for repairs, there was a car coming in or going out of the doors about every five minutes.

We had moved in about July, and the doors were usually opened in the morning and not closed until night. About November, complaints were heard about the cold draughts from the big doors, and the two men stationed at the entrances to check the cars were instructed to keep them closed except to let cars in or out.

The building occupied an entire block, and cars for "service" ran up a runway from one street to the upper floor, and cars for the "shop" went down a runway from the back street to the lower floor. The "service" door was most used, as the cars there were in for shorter jobs. This door was ten feet wide and about as high, and was constructed to slide up and down in the iron channels which held it at the sides.

It was operated by means of an endless chain, which ran over a wheel that was geared down to the double sheaves which supported the cables holding the door and its counterweight. When one side of the chain was pulled, it turned these sheaves and moved the door up and, by pulling the other side of the chain, closed it.

It took about 30 seconds to open the door, and slightly less to close it—and it was hard work. The quantity of frigid air that whistled in through that doorway in a minute was amazing, and it was dangerous for the men who were perspiring over or under the cars in their shirt sleeves. Conditions grew so bad, as the weather became really cold, that I decided to put in an electrically-operated door.

Three contractors estimated on the job, and their figures averaged \$1,100. This looked too high, so I took a folding rule and a drawing board, and decided to make our own "power door."

The door was about three inches thick—of wood sheathed to weigh about 1,400 pounds. I had decided that the door was to open or close in five seconds. It lifted eight feet, and my calculations of inertia would require about a three-horsepower motor. The steering-gear drive of one of our old models consisted of a heavy steel worm and a 20-tooth gear, in a cast-iron case. This figured out to be strong enough. With a motor speed of 1,200 r. p. m., the speed reduction would be about right.

I bought an 18-inch piece of heavy iron pipe, four inches in diameter, and had our lathe man cut a thread on it to fit a piece of $\frac{3}{8}$ -inch steel cable. We put steel plugs in the ends, and a 1-inch shaft was keyed through them. This made our winding drum.

A heavy-duty motor, second-hand, was bought for \$65, and our carpenter built a framework of 4-inch wood as a base for the outfit. The blacksmith made a bracket to hold the worm-gear case in alignment with the motor and the drum. The motor was directly connected to the worm-shaft and the gear-shaft was connected to the drum-shaft, both by flexible couplings.

Two single-cable sheaves—D and E—and the double sheave, F-G, were fastened on them as shown in the illustration. The pulley, F-G, was set into a hole we cut through the low brick wall which bordered the runway.

The chain-and-gear arrangement of the main-door pulleys was junked but the two main cables from the door to the counterweight were left. Three turns of a $\frac{3}{8}$ -inch flexible cable were wrapped about the grooved drum, X, and one end carried under the pulley F, up over pulley D, and attached to the top of the counterweight. The other end was taken over pulley G, down under E, and fastened to the bottom of the counterweight with a turnbuckle.

Our electrician had wired up the motor to a double-throw switch in the checker's booth at the top of the ramp. This was so connected that the circuit was broken if the small door—cut in the bottom of the large one—was opened. This small door closed itself by means of a spring.

This outfit worked to the "queen's taste." When the switch was thrown one way, the door opened. When thrown the other way, the door closed. It did either in five seconds. The switch had to be thrown off at about half the travel of the door, as the motor "coasted" after the circuit was broken.

Therefore, a brake, which was actuated by an electric solenoid, was added on the motor shaft. An automobile brake drum was fastened on the shaft, and the plunger of the electromagnet connected to it. When the motor switch was closed, the magnet was energized and released the brake. When the switch was opened, the magnet released its pull, and a powerful spring applied the brake. This stopped the door in about two inches.

The whole equipment, including material and labor, cost about \$500 and, when I last heard of it, the door was still functioning satisfactorily.—H. S. T., Mass.

* * *

Burned-Out Headlight Bulbs.

Headlight bulbs are often burned out on Fords when the lighting current is taken from the magneto. This is often true when the particular magneto is especially strong or the magneto coils have been adjusted, the rear main bearing replaced or the magnets charged.

This trouble can be remedied by placing a suitable resistance in the lighting circuit, and the strong current is still available for starting.

Such a resistance can be made by coiling a piece of bailing wire around a $\frac{1}{2}$ -inch rod. The coil should be fastened to the dash and connected into the circuit. It should be insulated at the points at which it is fastened to the dash, and so located that it cannot cause a short circuit by touching another metal object.

The length of the coil will have to be determined by the cut and try method, but if a long coil is used and then lessened until the lights are bright, it will be approximately correct.—S. E. G., Iowa.

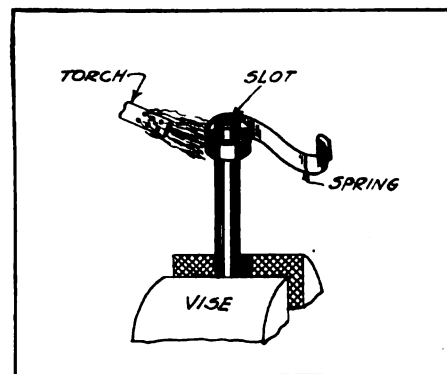
* * *

Useful When Brush Spring Breaks.

The following will be found useful in a garage:

If one of the springs on the brushes in a Ford starter breaks, it will fail to run. Take a piece of iron rod $\frac{5}{16}$ -inch by three or four feet long, so that it can be held nicely in a vise. Put it in the vise in a vertical position and saw a cut in the upper end $\frac{3}{8}$ -inch deep.

Take a spring of similar size to that of the old broken one, put one end into the place where you sawed, heat with the blowtorch, catch it with the pliers, and wrap it



Wrap Around Rod Until Similar to Old Spring.

around until it appears the same as the old one.

When ready to insert, place the spring down into the starter. Use a rod to tighten the spring by twisting it so it will go down into its place, and see that it bears down on the brush.—C. A. M., N. Dak.

Readers' Questions and Answers

Establishing Automobile Agency.

We propose establishing a general automobile agency and should like to obtain the agency for a good moderate-priced car selling for from \$800 to \$1,200 and the agency for a higher-priced car selling from \$1,500 to \$2,400.

How should we go about securing the agency for cars (a) exclusive agency (b) branch dealer?

What percentages of profit are given to (a) exclusive agency (b) branch dealers?

What sources of detailed information in regard to such a business are available and how can these sources be approached?—M. J. R., N. Dak.

The best method for securing the agency, either as the exclusive agency or branch dealer, is to go direct to the manufacturer or distributor. Be an exclusive agency.

Most percentages are on a sliding scale, according to the number of cars handled in a year.

You may obtain detailed information along this line through personal acquaintance with owners or managers of such business. Also through the automobile dealers association and through the Automotive Equipment Association.

* * *

Method for Cleaning Castings.

Can you give me a good formula for use in cleaning brass castings?—D. T. L., Mich.

A solution which has been found effective for the purpose you mention is made by combining three parts of sulphuric acid with three parts of nitric acid. After these ingredients have been mixed, add a quart of common salt. The mixture should be stirred until the salt is entirely dissolved. Then pour into an earthenware vessel.

The castings should be removed from the solution immediately after dipping, and rinsed in clear water.

* * *

When Steering Is Difficult.

Can you please advise me on the following: I owned a Ford some time ago and, in making an unusually short turn, something gave. From that time on, it was hard to steer the car, but I could never locate the trouble. I have driven other cars like that since, where trouble was caused by the same thing, but the owners are at sea the same as I am.

I would like to have your opinion published at your convenience.—J. H., Ill.

In making a sudden turn at a high speed, quite often the Ford front wheels will "buckle," frequently springing one of the arms on the spindle and, even though the wheels are trued up for distance both back and front, one will show more side pressure than the other. This causes a continual pulling to one side of the road. A new spindle will correct this trouble.

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your business, the more you will know—and the more you know, the more money you will make.

Whether you are a dealer, a salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

Again the front assembly might be racked, throwing it out of square; that is, the front hub on the left would not be the same distance from the rear hub as the hub on the right. This will also make them steer hard. The front member of the frame may be sprung back too far, allowing the axle assembly to set under too far, or lean back at the bottom as it were. This will make it steer hard whichever way the wheel is turned. In fact, it will steer as if all of the joints were overtight.

* * *

Cost of Service Station Operation.

I shall appreciate it if you can give me some information along the following lines: What would be the percentage of cost of operating a service station; the percentage allowed for investment; the overhead; how many employed and relative salaries; percentages of actual profits on service rendered; are there any flat rates for service issued by any of the car manufacturers and have you them available?—M. A. F., N. Y.

The statistics which you desire are so dependent upon other relative conditions that we cannot furnish you with any definite data.

There is a wide variation, depending up-

on the type of a garage utilized and the type of car in question. The cost of operating the service department in a large, properly-planned garage and sales agency is much lower than in a small, exclusive service station.

Departmental overhead depends upon a great many factors—space occupied by shops, storage, stockrooms, salesrooms, number of people employed in each department, whether certain departments are feeders or income producers, etc.

Interest on investment should not be considered as cost, but should be used relatively in determining net operative results. The current rate is usually figured—6 per cent.

Most car agencies sell on guaranteed service—specific or implied. This guarantee varies from 30 days to 6 months. It varies from \$5 per car sale for 30 days to \$10 per month for 6 months per car sale. In other words, guaranteed service, specified or implied, runs from about \$5 on Fords to \$60 on Studebaker, Oakland, Overland, and similar cars, with cars of higher-priced chasses running considerably more.

A good service station and service guarantee sells cars and every car sold is a feeder for the storage, shop, parts, accessories, oil and grease departments.

Shop overhead in a well-organized garage will run about 40 cents an hour direct labor—a good garage will show about 25 cents per hour profit on sold labor. You cannot figure profits on percentage of sales to any good purpose, as there are no figures so misleading as percentage of profits on sales.

We believe the Ford Motor Co. is the only concern using flat rates for service. You can very readily procure these from one of the local agencies. It is a debatable question whether this method has proven better than the old method. We know of two agencies carrying about the same quota of sales, one claiming to lose \$12,000 a year on the shop, and the other claiming a net profit of \$4,000 for the same period.

Few Ford dealers using the flat rates figure unit job costs, and so are not in a position to furnish reliable information in the matter. There are instances where Ford owners prefer to pay regular hour rates at an authorized service station.

No matter how good the inspection and supervision, there is always a tendency to scamp on the flat rate.

We can suggest one concern where car sales average 50 a month, where non-chargeable shop labor and overhead average \$300 a month.

We do not believe that any reliable figures could be furnished you without an extensive survey covering ten or twelve representative garages and sales agencies. If you can furnish more particulars as to

class of car, size of town in which service station is to be established, type of garage, and sales quota expected, we might possibly formulate some statistics of value to you.

* * *

Changing Drive of Carter Car.

I have a Carter car with a disk and fiber wheel drive. How can I change it over to a different drive? The friction drive is not satisfactory.—M. E., Iowa.

As you do not tell us which model Carter car you have, it will be impossible for us to give you definite information.

Several of the Carter cars used Northway motors, so your first task will be to obtain a flywheel and clutch from a similar motor. The Oakland, Cole and Jackson used motors similar to those used in some models of the Carter.

As there is no easy means of installing a mid-frame transmission in your car, you will probably find that another rear axle and attached transmission can be installed easiest.

The clutch control, gear-shifting lever, the universal joint and a suitable support for the front end of the drive-shaft will have to be fitted up carefully, which will prove a more or less difficult task.

A few years ago, while the Carter cars were comparatively new, some owners made such a change and were fairly well satisfied with the results they obtained. Now the Carter cars are rather old and the selling price of standard cars of the same size and age is so low that they could probably be bought for less than the labor and parts for the rebuilding job would cost.

In such a case, the Carter car could be sold for something and repair parts could be obtained easier than for a specially rebuilt job.

You might buy a good chassis and body at a low figure and, by installing your motor and tires, get a serviceable combination.

* * *

Running Generator From Line Shaft

I am considering putting in a direct-current generator, 64-volt, of about 1,500 r.p.m., to charge batteries. I expect to run off my line shaft. Also I may want to use lights off of it too. I have a single-cylinder gas engine, with a hit and miss governor.

The governor usually catches on one explosion except when starting some piece of machinery like an emery wheel or lathe with a heavy load. Then sometimes it will take three or four explosions before it will catch.

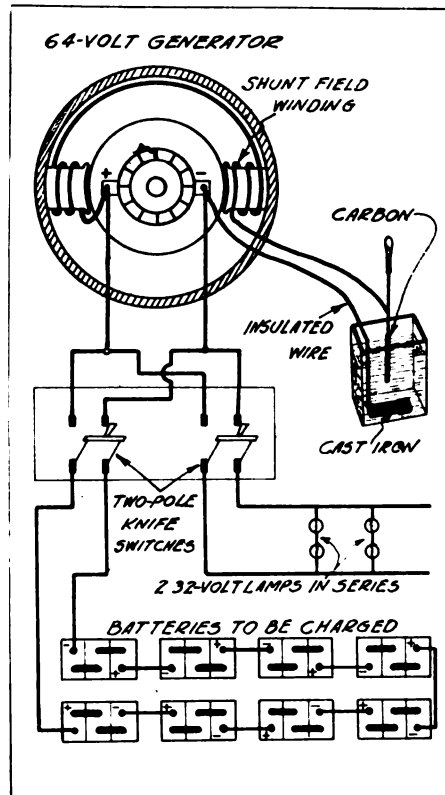
Do you think that will affect the generator?

I would be pleased to have you give me complete instructions for switchboard wiring and all. This is a shunt wound machine.—F. B., Tex.

A 64-volt generator can be operated quite satisfactorily running from the line shaft. Of course, there will be a little fluctuation in the speed of the generator, and this will cause the lights to go bright and dim, according to the change of voltage due to this speed fluctuation. Eight 6-volt batteries can be charged satisfactorily from

the generator with a full shunt field in the circuit.

The illustration shows a method of connecting up the generator to the switchboard using two 2-pole knife switches, one for the charging circuit and the other for the lighting circuit. It will be necessary to



Connecting Up Generator to Switchboard, Using Two 2-Pole Knife Switches.

connect two 32-volt lamps in series, as shown, as 64-volt bulbs are not manufactured.

A water rheostat, consisting of a glass jar filled with water to which has been added a little salt, is shown in the illustration. The insulated wire leads from one of the brushes to a piece of cast iron in the bottom of the jar. A suitable handle should be supplied so that the height of the carbon can be varied. This will control the output of the generator in volts and amperes.

It will only be necessary to use the rheostat when you find that the generator is producing too much current for proper charging. For instance, when one or two batteries only are in the circuit and no lights on, the output would be rather high.

* * *

Methods for Drilling Glass.

Will you kindly tell me in your next issue how to drill holes in plate glass, such as windshield and side shield glass?—A. A. W., Wash.

In drilling holes in glass, use a brass pipe having an outside diameter equal to the size of the hole required. This pipe should have a peripheral speed of 100 feet per minute.

Use carborundum, 80 to 100 grit, or a valve-grinding compound with oil. This

mixture should be placed between the end of the pipe and the glass. The glass must be supported by felt or rubber cushions not much larger than the hole to be drilled. When filing glass, use turpentine. Holes up to $\frac{1}{2}$ -inch in diameter can be drilled in glass with a flat drill properly hardened. Use a mixture of turpentine and camphor for the lubricant.

If a flat drill is to be used for drilling glass, heat to a cherry red and harden in sulphuric acid.

Another suggested method is: Grind the points of a small three-cornered file from one corner and the bias from the other. Set the file in a brace, similar to that used in boring wood. A smooth surface should be covered with a blanket, and the glass in which the holes are to be bored placed upon it, after which the boring of the hole should be commenced.

When you have made a slight impression upon the glass, place a disk of putty around it and fill with turpentine, which will prevent too great heating by friction. Continue to bore the hole. Be careful not to press too hard on the brace while drilling. The hole should be as smooth as one which is drilled in wood with an augur.

A third method recommends the use of turpentine and camphor when drilling with a common drill. After the point of the drill has come through, the hole should be worked with the end of a three-cornered file, having the edges ground sharp. The corners of the file should be used to scrape rather than as a reamer.

Care should be exercised not to crack or flake off pieces of the glass while finishing. Use the mixture freely, both while drilling and scraping.

* * *

Grind in Gears.

During a recent snow storm, a Cadillac eight-cylinder car skidded into the curb. One of the rear wheels was demolished and the axle housing was bent severely.

The housing was removed from the car and straightened and such parts replaced as seemed necessary.

Since the accident and the repair of the car, there has been quite a severe grind in the gears in the differential assembly. Could you give me some idea of what is causing these gears to grind since it has been repaired?—E. P. G., Pa.

Your trouble with the gears in the Cadillac car you mention may be due to one of the following causes:

First, the differential housing may be still somewhat out of shape or not straightened to its original accuracy, not allowing the ring gear to mesh properly with the pinion gear.

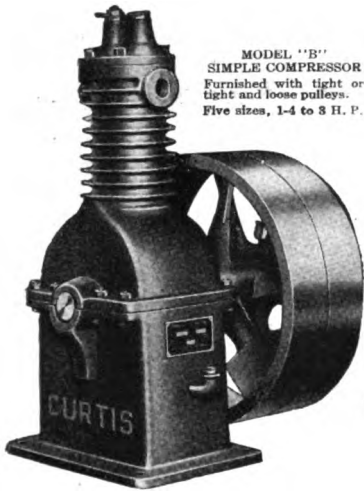
Second, in reassembling, there is a possibility that the adjustment of the ring gear and the pinion gears was not properly made.

Third, lack of grease will sometimes cause a grind similar to the one you speak of.

CURTIS

Air Compressors

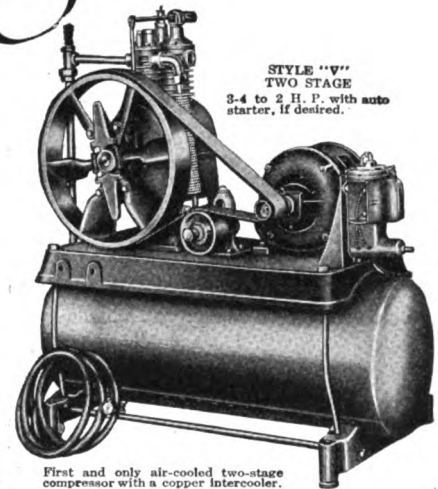
"An Original Design"



MODEL "B"
SIMPLE COMPRESSOR
Furnished with tight or
tight and loose pulleys.
Five sizes, 1-4 to 8 H. P.

CURTIS Compressors are the original and exclusive development of the Curtis Engineering staff, guided by advanced principles of sound design and the experience gained through 67 years' manufacturing experience, over 25 of which have been devoted to pneumatic machinery.

SINGLE AND TWO STAGE



STYLE "V"
TWO STAGE
3-4 to 2 H. P. with auto
starter, if desired.

First and only air-cooled two-stage
compressor with a copper intercooler.

THESE features are exclusive and original with the Curtis Compressors —

1. CONTROLLED SPLASH OILING SYSTEM permanently regulates cylinder lubrication—no excess oil to rot tubes. Big saving in oil.
2. HIGH AND LOW LEVEL OIL GAUGE tells at a glance amount of oil in crankcase.
3. FAN FLY-WHEEL helps cool cylinder; increases capacity.
4. VALVES light weight, large area. Can be inspected without removing head.
5. HEAD removable without loosening pipe connections. Only one gasket.
6. SAFETY CAGE prevents broken valves dropping into cylinder and wrecking machine.
7. HAND UNLOADER permits starting against pressure, prevents burning out motor, blowing fuses or jumping belt.
8. LARGE DROP FORGED CRANKSHAFT; adjustable, renewable, die-cast, non-cutting bearings.

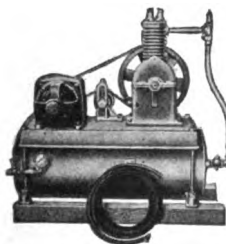
CURTIS Two-Stage Compressors embody all the features of the Single-Stage, plus —

COPPER INTERCOOLER. The efficiency of a two-stage compressor depends primarily on the efficiency of its intercooler, which varies with the kind of metal, its thickness and design.

Copper (better than any metal, except gold or silver) conducts heat 135% faster than cast iron.

Curtis Intercoolers are made of copper with thin copper radiating fins rigidly attached. Intercoolers made of cast iron or of pipe with cast iron washers slipped on effect little saving over a single-stage compressor.

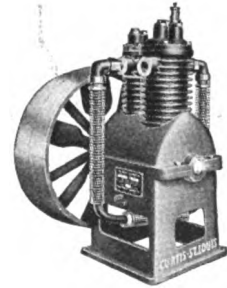
VERTICAL CYLINDER TYPE provides a truly balanced design with uniform load on crankshaft. Machines of horizontal *opposed* type have an opposed or reciprocating strain on the crankshaft. The Curtis design assures less strain, vibration and wear, also longer life.



STYLE "V"—FIVE SIZES
Furnished belted or geared to A. C.
or D. C. motor.



2-STAGE SIMPLE COMPRESSOR
Furnished with tight or tight and
loose pulleys.



Curtis Pneumatic Machinery Co.
1515 Kienlen Ave. St. Louis, Mo.

Canadian Representative, Joseph St. Mars,
706-B Sterling Bank Bldg., Winnipeg, Can.

Branch Office:
530-U Hudson Terminal, New York City

The Story of the Gasolene Pump

You Know How Valuable Your Gasolene Pump Is to You, but Do You Know the Many and Interesting Steps Necessary for Its Assembly or the Careful and Precise Workmanship Required Before It Is Ready for Your Use?

Every citizen of the United States is acquainted with the cheerful, brightly-colored silent salesman of gasolene which stands outside of filling stations and garages. There are 26,000 to 30,000 filling stations in the country. Every one of them has at least one pump, and hundreds of them have several pumps apiece.

Uncomplainingly—day in and day out—they deliver gasolene to the millions of automobiles which come to them for fuel. To the automobilist, a primrose on the river's brim is one-twelfth dozen primroses and it is nothing more—Also, to the automobilist, a gasolene pump is simply a dispenser of gasolene. He gives no thought to the meticulous care employed in its assembly, nor to the precision with which the accuracy of its delivery is determined.

Yet a visit to a pump manufacturing plant brings a revelation of careful and precise workmanship. At least it did to the writer during a recent visit to the plant of the Wayne Oil Tank & Pump Co., at Fort Wayne, Ind.

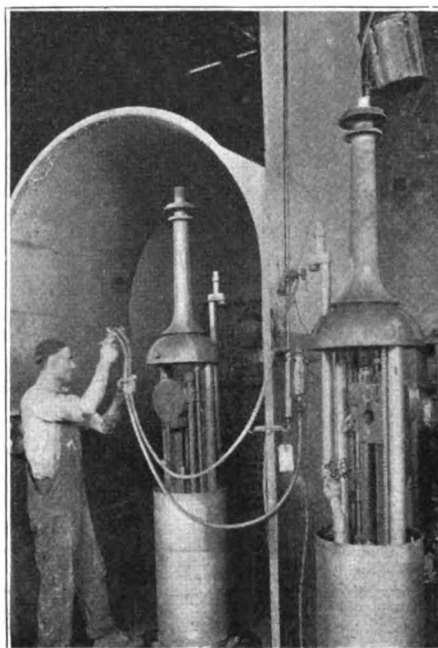
Production is based on quarterly schedules, determined at a conference of various executives, and from these schedules the planning department figures all sub-schedules for minor assemblies. At all times, parts and raw material must be available for every operation or sub-assembly that is to be made.

All purchase orders for raw material and production orders on the factory originate from these schedules, which keep the stock in perfect balance at all times.

Control boards, one for the factory and one for the purchasing department, show at all times whether or not any item is running ahead or behind schedule.

Production orders on the factory are first referred to the standard section of the

production department where all shop tags, drawings, operation tickets and requisitions for material pass through the stock records before the orders are passed into the factory, to avoid the shortages arising after



Air Spray Used for Painting Pumps.

the orders have been dispatched to the machine-shop or assembly department.

All finished parts are scheduled for completion 30 days in advance of the final erection of the finished product.

When new material is received at the plant, it is first inspected and counted. That which is completely finished and ready for assembly goes immediately to the department of finished stores. This department is adequately equipped with mechan-

ical and gravity conveyors for the handling of all stock.

Such material as is not ready for use in the assembly process is sent to stock and issued to the departments necessary to put it in condition for assembly, and it is then placed in finished stores awaiting production or shipping order.

Some parts, such as rough castings, go first to rough stock and are held there until a production order is issued. Some are sent to the various departments, such as sand blast, galvanizing department and machine shop, where they are completed and sent to finished stores.

From the machine shop, some of the different parts go to the nickeling or other departments and others to finished stores. Other parts go directly to the paint department as soon as received, and from there to the finished stores.

In the department of finished stores, the various parts for the complete assemblage of any production order are brought together and distributed to the assembly department where the various minor and sub-assemblies are completed before the pump really begins to take shape.

Such castings as are purchased are bought rough. Many rough castings are later to be galvanized or painted, and a smooth surface is put on these castings with a sand-blast. In a specially-designed sand-blast room, small shot of carbon steel are blown for from five to 20 minutes—depending upon the size of the casting and the roughness of its surface—through a 2-inch hose with a 1½-inch nozzle under a 34-pound air pressure.

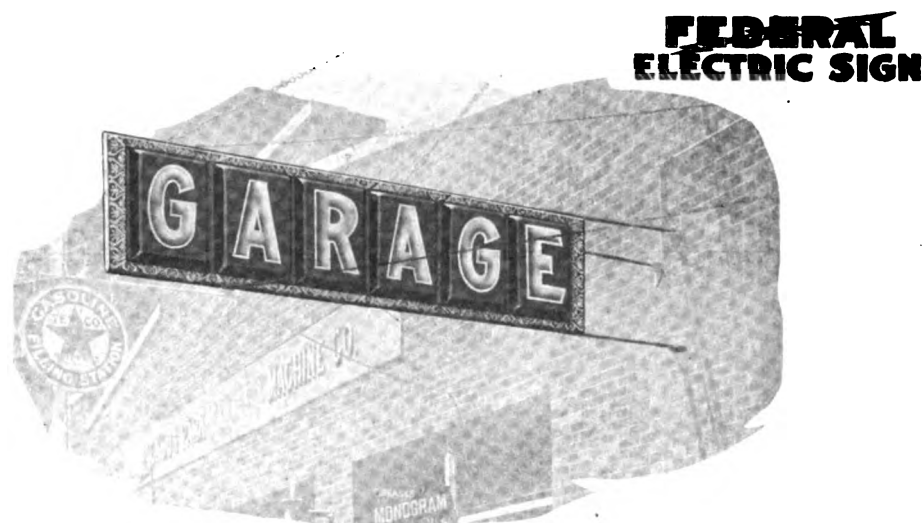
Castings which will come into contact with gasolene are galvanized individually. Prior to galvanizing, the casting is dipped into a 10 per cent sulphuric acid bath and then



Parts Ready to Leave Stockroom for Assembly.



Showing the Pump at First Stage of Assembly.



The Business Magnet that you need---Now

Dark winter days are here — your place of business is lost in the cold, gray appearance of the street. Prospective customers are hurrying here and there in the cold.

Suddenly—

In front of your store there appears a bright, sparkling, cheerful Federal Electric Sign—out of the dreary street

flash rays of inviting light. Your location and the nature of your business are stamped indelibly on the mind of the passerby—the impulse to buy is instantly aroused.

People can't resist the drawing power of your Federal Electric Sign—the business booster that pays for itself over and over again.

12 MONTHS TO PAY

A small payment brings you this wonderful new sign—it pays for itself while you pay for the sign—beautiful blue and white porcelain enameled background—the big letters are of snow white silveray glass, smooth and very easily read from a great distance in each direction. Only two bulbs are required for each letter—ten bulbs for the sign shown above—costs very little to maintain—only 3 or 4 cents an hour for electricity.

A wonderfully attractive 24-hour a day salesman that will bring in business and new customers for years to come—long after it has more than paid for itself. Remember—a Federal Electric display is the cause of a busy store—not the result. Employ this unusual business booster without delay. You need it now. Send coupon for full information and prices as well as free sketch showing how your Federal Electric Sign will look. No obligation—do it NOW.

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 So. State St., Chicago, Ill.

Please send me full information, price and free sketch of Federal Electric Porcelain-Silveray Sign for my business. Explain your Easy Payment Plan.

Name City..... State.....
 Street and No..... Business
 Store Frontage No. of Floors.....

Federal Electric Signs are the cause of a busy street—not the result

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

into a 75 per cent hydrochloric acid bath. After the acid baths it is oven-dried and, when thoroughly dried, it is ready for the galvanizing process, which precedes any mechanical work on the casting.

After it has been galvanized, the casting goes to the machine-shop, where the necessary holes are drilled in it and it is machined to fit. The heavy face-grinder re-

with the latest types of machines, to insure all production schedules being faithfully fulfilled. These machines consist of automatic screw machines, automatic chucking machines, automatic gear cutters, slotters, turret lathes, engine lathes, large drill presses, presses, single and multiple spindle presses, diamond grinders, disk grinders, spindle pipe machines, stamping presses and tapping machines. Practically all special cutting tools and jigs are manufactured in the Wayne company's oven plant.

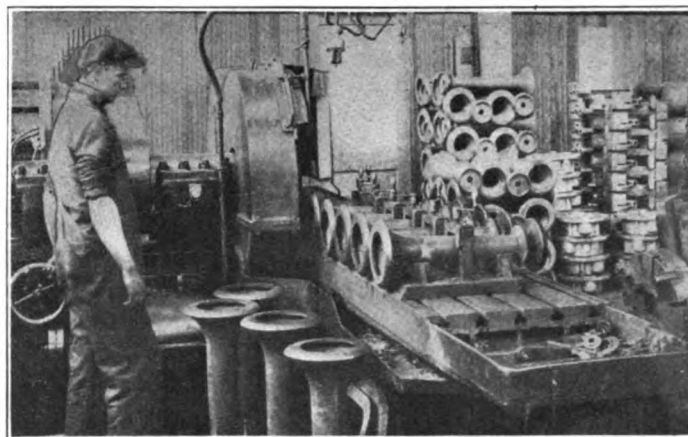
A good idea of the variety of parts going into the assembly of gasoline pumps, and of the necessity for a rigid production schedule and careful checking, is given by illustration which shows trucks carrying parts from the stockroom to the first assembly room.

Before the final assembly of parts to make a completed pump, the various parts are put together in "minor assemblies" and the minor assemblies are then "sub-assembled." The sub-assemblies go into the assembly where the pump really begins to take shape and look like a pump. Among the minor assemblies are the meter, pump head and plunger, and typical sub-assemblies are the bottom head and the top head.

After the bottom head, cylinder, plunger, top head and pump head have been assembled, the assembly goes to the test pits and is tested for accuracy and sealed. The first and second stages of assembly are illustrated.

In the pits, the pump is carefully tested to see that the piston is tight and to be sure that there are no sand holes in the shell. Here is also made the gallonage delivery test. The government allows only two cubic inches of tolerance per indicated gallon, and the thoroughness of inspection and the care entering into the manufacture of gasoline pumps is indicated by this small tolerance.

After testing, the pump has its dome supports, dome, door shell and the pedestal shell added to it and then passes to the electrical department where the wiring is done and conduit boxes are installed. It is then given another careful inspection and testing and its plate number is



Heavy Face-Grinder Removes Inequalities Not Reduced by Sand-Blast.

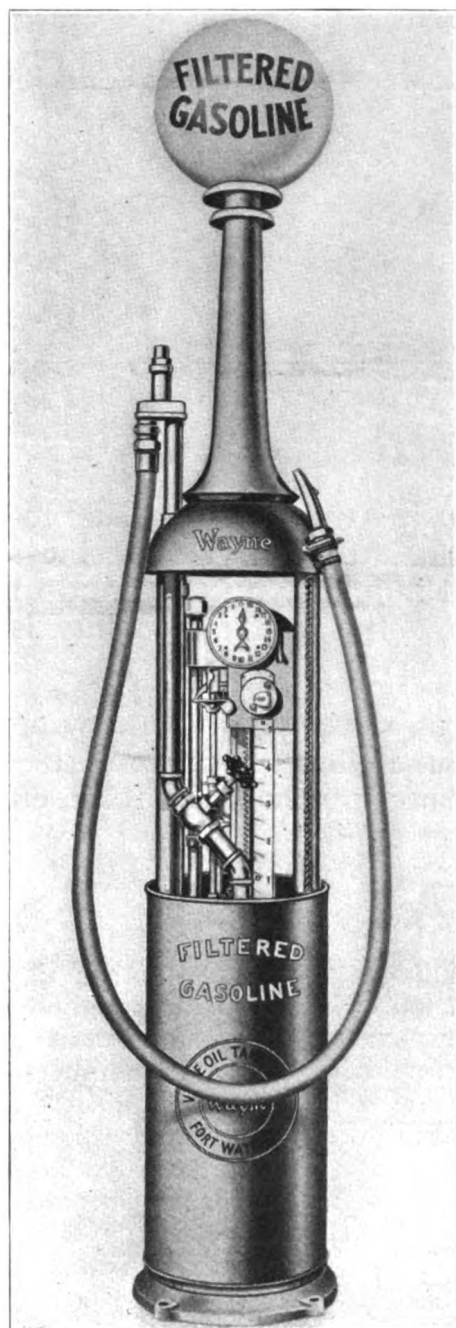
put on. The pump is now ready for painting.

First the pump is given a priming coat with an air-spray and then it is dried in an oven. Here the pumps are kept for from four to eight hours at a temperature of 170 degrees Fahrenheit. The air circulating through the oven is washed to remove all dust particles, and is blown into the oven through six chutes.

After the first priming coat is dried, it is rubbed down carefully with No. 2 sand-paper. A second primer coat is then applied and dried. Next, the pump is given a coat of color varnish which is also dried in the oven. After the color varnish is dried, all transfer trademarks of the company ordering the pumps are applied and the lettering is put on.

After having been painted, varnished and lettered, the pump is ready for final assembly. It is now given its meter, quantity scales and all measuring elements, and subjected to a final rigorous inspection during which every part of the pump is inspected and the Underwriters' plate attached. The pump then is sent to the crating room, where it is wrapped and crated, together with its accessories, such as the hose and foot-valve. Its globe accompanies it in a separate carton.

From the crating room it makes its last journey in the shop to the finished warehouse, where it awaits, with hundreds of others, the order for shipping to its owner.



Ready for the Crating Room.

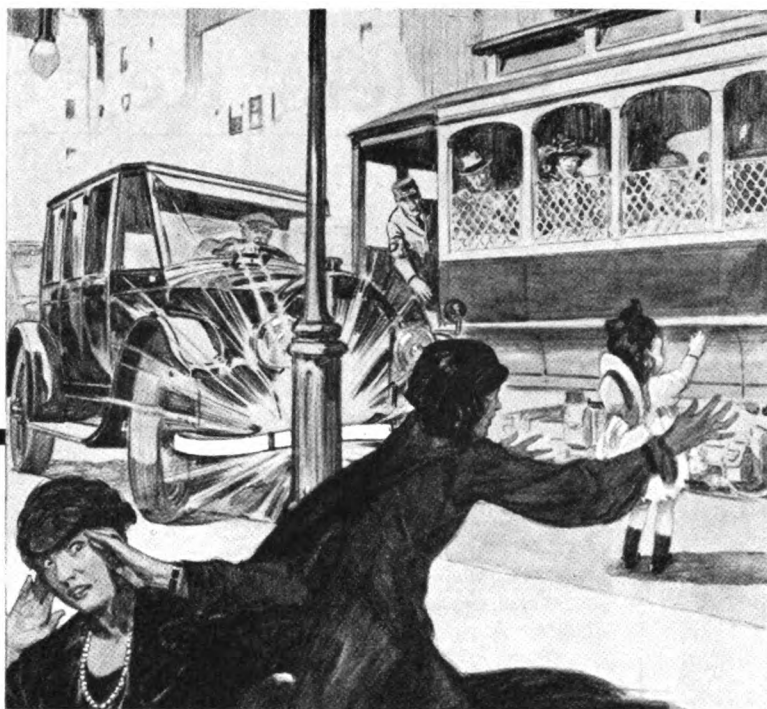
moves all inequalities not reduced by the sand-blast.

After machining, all parts are inspected and sent to the storeroom. The constant inspection of every part after every process impresses the observer as symbolical of the care necessary in the preparation of a device which must function accurately in all kinds of weather and in the hands of men of every degree of intelligence.

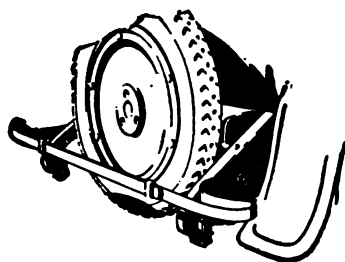
The machine-shops are fully equipped



Pump Is Now at Second Stage of Assembly.



SAVED!



Lyon Bumpers are quickly and easily attached to any car, even when equipped with Snubbers. No alteration is necessary.

List prices of the regular Lyon Bumper range from \$10.00 to \$17.50, according to size and finish. The Lyon Convex Bumper, having all the bumping advantages of the regular Lyon Bumper plus an unusual design, lists for a slightly higher price.

The Special Lyon Bumper for Fords lists for \$10.00 to \$13.00. Will fit Fords equipped with Hassler Shock Absorbers.

BRAKES jammed! Too late to stop! A tense, agonizing second—then, *smash* into the pole.

Nobody hurt and no damage done—the car was Lyon-protected.

This is one of the reasons why Lyon Bumpers are so easy to sell—every one will take the full force of a blow 15 miles an hour without damaging the car or the bumper—this is a guaranteed fact!

It is the construction of Lyon Bumpers that makes them a safeguard for every car; when struck, the blow is *absorbed* by the Lyon-

patented opened "loop-ends"—the chassis never feels it!

Lyon Bumpers are positive collision protection; so positive that insurance companies make a 12½ per cent reduction in their collision rates on cars protected with Lyon Bumpers front and rear.

These superiorities plus an unusually attractive appearance, make the sale of Lyon Bumpers a profit-paying accessory. We assure prompt delivery through your jobber—our production is 5000 Lyon Bumpers a day.

METAL STAMPING CO., Long Island City, New York

Car Dealers: Our bumpers are manufactured under ~~our~~ Lyon patents. More than a million Lyon Bumpers are already in service. Millions more will follow!

Jobbers: If your stock doesn't include Lyon Bumpers, write to us; our proposition will benefit both of us—it is fair and square.



Lyon Standard Bumper



Lyon Convex Bumper

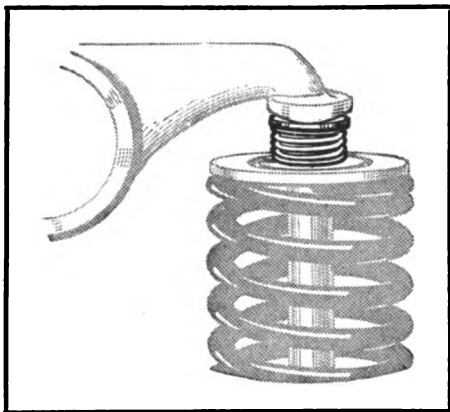
LYON RESILIENT BUMPERS

Accessories—Dealers' Key to Profits

Overhead Valve Motors Made Noiseless by New Device.

The Lane rocker arm silencer keeps the valves of overhead valve motors working as noiselessly as on the day the motor left the factory.

The spring in the silencer takes up all lost motion in the moving parts, between



Spring in Silencer Takes Up Lost Motion.

the valve stem and the camshaft. The indestructible fiber pad contained in the brass cap eliminates the noise caused by the tapping of the rocker on the valve stem of the motor.

A silent motor is something desired by all motorists, and the ease with which a set of these silencers accomplishes complete silence, makes it a highly desirable accessory. They are easily attached and, once installed, no further adjustments are necessary.

A complete set sells for an insignificant sum. Write the National Equipment Co., Commercial Trust Bldg., Philadelphia, Pa., for a copy of circular 19. It gives complete details.

Have You Seen the "Letters About Lizzie?" Get Your Copy Now!

"Letters About Lizzie" is an interesting little booklet with some real news in it—news that every garageman and dealer will want to read. Why?

Well, in the first place, to quote from the booklet, "It's what the user says that counts." There isn't anything more convincing than to know the "other fellow's" experience. That's just what "Letters About Lizzie" will tell you.

The Midway Garage, at Huntsville, Ohio, writes: "Will say the Ever-Tyte rings are O. K. in every respect. I put the first set I received in a Ford Model W put out in 1905, and the old car has better compression than it ever had. She goes on the first or second lift of the crank every time, and such power for a little car you never saw. It takes the hills on high like a 'scared cat.'"

Then there is this endorsement from the business manager of the School of Mines and Metallurgy of the University of Missouri, at Rolla, Mo.:

"Last September we installed a set of Zelnicker Ever-Tytes in a Ford. The results have been so highly satisfactory that we would like to equip a number of other machines which we use for transporting vocational students from the school to the country in pursuit of their engineering studies. These machines get very rough handling and make more trouble than machines in ordinary use. All told there are about a dozen machines."

Here is what A. W. Almquist of the automotive engineering service department, Thomas A. Edison, Inc., Orange, N. J., has to say of Ever-Tytes:

"The Zelnicker Ever-Tyte piston rings submitted have been tested on a block dynamometer as well as on the road for 2,000 miles in a Ford car, and have proved satisfactory in every respect.

"Using Ford standard Champion spark-plugs, Ford standard Holley carbureter, standard gasolene, S. P. G. at 60 degree Be. and Mobile oil, Grade E, the following improvements in engine were shown:

"Increase in compression—25 per cent,

"Increase in power—12 per cent,

"Decrease in gasolene consumption, 12 per cent,

"Decrease in carbon deposit—35 per cent,

"Decrease in wall friction—10 per cent."

These are just a few of the testimonials received from delighted users of Ever-Tyte piston rings.

Don't forget that the right angle interlock in Ever-Tytes keeps the three members of the ring from separating and wearing independent seats in the groove—it is

the safeguard against leakage and a guarantee of complete compression.

"Letters About Lizzie" booklets may be obtained free by writing the Ever-Tyte Piston Ring Division, Walter A. Zelnicker Supply Co., Wellston District, St. Louis, Mo.

Clever Display Signs Build Sales for Jobbers and Dealers.

The sudden temperature changes of the present winter have played havoc with car owners. A man may leave his radiator filled with water on a moderate night, with no expectation of a change in temperature before morning, only to wake up and find his radiator frozen solid and generally cracked and leaking.

Our illustration shows the clever display of the Automobile Supply Co., one of the largest jobbers in the United States, which has taken advantage of the seasonal value of a radiator that cannot be damaged by freezing.

The core of the Jaffe radiator, which is the basis of the window display, is guaranteed against freezing damage in the following words: "The Jaffe Radiator Co. will pay \$100 reward to anyone who can prove that the core of the Jaffe radiator can be damaged by freezing."

This guarantee has been a great pulling factor in "Tasco" sales, and full advantage has been taken in the window of the three-color display signs, which the Jaffe Radiator Co. furnishes to its jobbers and dealers, carrying the name of the firm that displays them.

Full information regarding these attractive display signs can be had upon request from the Jaffe Radiator Co., 741 W. Van Buren St., Dept. 4, Chicago, Ill.



Seasonal Value of Radiator That Cannot Be Damaged by Freezing Taken Advantage of in This Display of One of Largest Jobbers in United States.

Make Your Store the Most Talked of in Your Town

The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En-ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.

It is **not** given away.

It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

There is absolutely no other way by which you can secure this sign. It and every one of the epigrams are copyrighted. There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

Write today for full particulars. Learn all about the Big En-ar-co Boy and Slate Sign, the epigram service, and the other advertising helps we give our dealers. Be the first in your community to get started. Use the Coupon. Use it **Now!**

THE NATIONAL REFINING COMPANY

National Headquarters, L-731 National Bldg., Cleveland, Ohio

4 Modern Refineries

93 Branches

THE NATIONAL REFINING COMPANY,

L-731 National Building, Cleveland, Ohio

Without obligation to me please send full detailed information regarding the En-ar-co "Boy and Slate" and Epigram Service, and other advertising helps.

Name.....

Address.....

City..... State.....

I now sell..... Oil.

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



Do You or Your Customers Control Your Credit Accounts?

So much stress is being placed upon the necessity for accuracy, system and simplification in accounting records that any practical aid to the carrying out of this desired end is welcomed by all.

You can appreciably reduce your bookkeeping by the use of a new system of

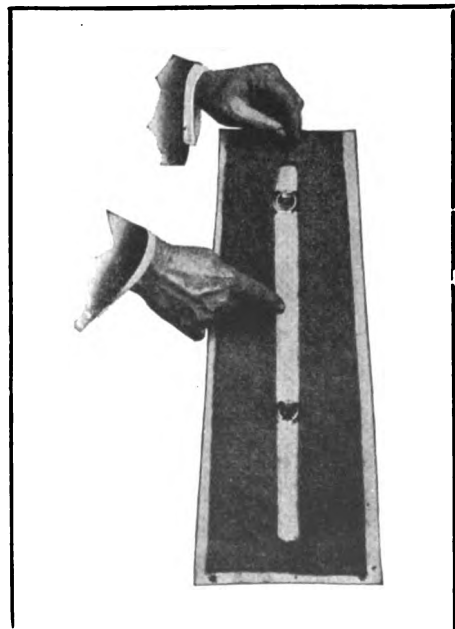
coupon books which is now being marketed. The books are attractive in appearance and convenient in size, readily fitting any vest pocket.

Various styles of coupons can be had, including those for gasoline sales only, for purchase of material including gasoline and payment of labor, or for payment of labor only. At a slight

additional cost, your name and book number, printed on each coupon can be had.

Making service quicker and easier for your customers will make it easier for you to get all their business. There is no opportunity for errors or disputes, as the customer pays you in coupons for the gasoline delivered and the transaction is finished.

Unless otherwise ordered, all books are made containing a charge or credit slip immediately under the front cover. If the book is sold for cash, it will be considered a cash sale. If you sell the book on credit, your customer signs the charge slip and



Reliable Oilers Provide Thorough Lubrication.

the bookkeeper makes his record from this slip. Only one entry is necessary.

When a customer—who has purchased a coupon book and had it charged—has used his entire book, then that customer has come to the end of his credit with you. You can demand payment before issuing another book without giving offense. This feature enables you to control your credit accounts.

"We are meeting wonderful success in the sale of coupon books. We believe they are one of the greatest business getters we have ever put in," wrote the vice-president of one oil company.

"National" guaranteed coupon books offer a real convenience and economy, as well as a means of getting business for distributors of petroleum products, garages, service stations, etc.

Prices, samples and other information desired can be obtained by writing the National Checking Co., 271 Chestnut St., St. Paul, Minn.

Reliable Spring Oilers Will Provide Thorough Lubrication.

The subject of proper spring lubrication has been forcibly brought home to car owners, by the Reliable Spring Oiler Co. in a recently issued folder wherein they ask:

"Why Not Use Sleighs in Summer?" It is a most effective piece of publicity and is bound to make automobile owners think.

Reliable spring oilers are said to provide a means of spring lubrication and protection which is of unusual importance to every car owner. They are made of a special grade of heavy canvas, thickly coated on one side with a waterproof preparation, which makes them impervious to weather.

Two heavy felt pads of a special shape are attached to the inner side so that, when the oilers are wrapped around the automobile spring, these felt pads lap over and extend down the side of the spring, while the water-proofed cover completely envelops the spring, thereby preventing rust and erosion which naturally follows as a result of driving cars in all kinds of weather.

The top of the oiler is equipped with self-closing oil caps, which are placed at frequent intervals to permit the easy application of oil. As the oil is poured into these openings, it runs down along the top of the spring and gradually saturates the felt pads, thus keeping the top and side of the spring constantly enveloped in oil, which means that the natural movement of the springs practically results in automatic lubrication.

This combined protection and thorough lubrication naturally results in greater resiliency and easy riding comfort, while also adding life to the spring.

Reliable spring oilers are made to fit all makes and models of both automobiles and

trucks. The common-sense practicability of this product is making it widely and popularly known throughout the automobile world, resulting in an ever-increasing demand for Reliable spring oilers.

The manufacturers have worked out a unique sales plan which practically makes it unnecessary for jobbers and dealers to carry more than a very limited stock. This, of course, will be welcome news to the trade and is sure to make Reliable spring oilers popular with both dealers and jobbers.

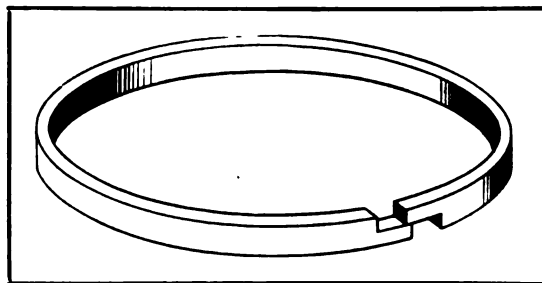
Full particulars of the plan can be had by writing direct to The Reliable Spring Oiler Co., at Columbus, Ohio.

No Rust—No Shopwear—Zelco Piston Rings Sell Themselves.

"Yes, sir! If all my stock required as little salesmanship as they do, I'd soon be on 'Easy Street.'"

And the speaker rubbed his hands together in gleeful satisfaction over his foresight in putting in a stock of Zelco piston rings, the occasion for the remark just quoted.

The appearance of Zelco rings appeals to the imagination of the buyer and inspires confidence at once in the merit of the ring, thus virtually eliminating the usual initial



Zelco One-Piece Piston Ring.

sales resistance. This means repeat orders and, of course, more profit for the dealer. For voluntary sales reduce merchandising costs.

A one-piece ring, the Zelco is made of a special grade, tough white cast iron, peened by a special process to produce a perfect circle under compression.

It is coated on its face with 0.002 of an inch of zinc, and on the sides and back with a 1/30,000-inch protective coating of the same metal.

In use, the surface wears to a perfect seat in less than an hour. As the zinc wears, it fills the pores of the cylinder, forming a glazed surface which results in a minimum of friction and wear.

Franklin & Son, of Arcola, Ill., wrote the following in regard to their experience with Zelcos:

"We installed Zelcos in a Cadillac 8-'SS' which was leaking compression and pumping oil badly. After assembly, the rings sealed immediately. The car had been run only a short time when it showed more pep and compression than it ever had before.

"NATIONAL" GUARANTEED Coupon Books

Draw Business Like a Magnet for Garages, Filling and Service Stations

You can substantially increase your gasoline, oil and accessory sales and at the same time please your customers by using National Guaranteed Coupon Books. Car owners appreciate the convenience afforded by National Coupon Books and prove ready purchasers.

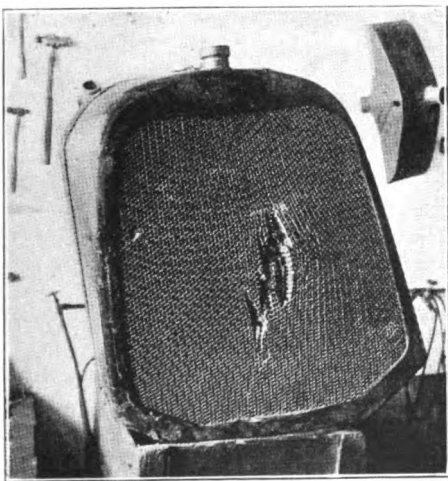
The motorist with a National Guaranteed Coupon Book will drive blocks out of his way to stop at the station where these coupons are redeemed because he knows he will get quicker and more accurate service. You eliminate a lot of bookkeeping and save time on every customer you serve. National Guaranteed Coupons will prevent errors and those vexatious disputes which lose customers.

National Guaranteed Coupon Books can be either sold for cash or used for charge business. In either case they will make your sales soar.

Write us at once for samples and prices

NATIONAL CHECKING COMPANY

271 Chestnut St., ST. PAUL, MINN.



I can fix it



The tougher the job the more you need me

When a car is brought in with a gaping hole in the radiator and the boss says, "Hey, Bill, see what you can do with this," I am the stuff the mechanic looks for before he starts cutting out the section that has to be replaced.

On a soldering job presenting unusual difficulties Kester Acid-Core Wire Solder is doubly valuable. Being self-fluxing, it not only cuts the work in half but it makes perfect soldering possible in the inaccessible places. The acid feeds with the solder in just the right proportion to make a perfect bond.



CHICAGO SOLDER CO.
4210 Wrightwood Ave. CHICAGO
The proof is yours for the asking

Am. Garage
2-22
Chicago Solder
Co., 4210 Wright-
wood Ave., Chicago

Gentlemen: Please send
me a free sample of Kester
Acid-Core Wire Solder.

Name.....

Company.....

Address.....

City.....

State.....

Our Supply House is.....

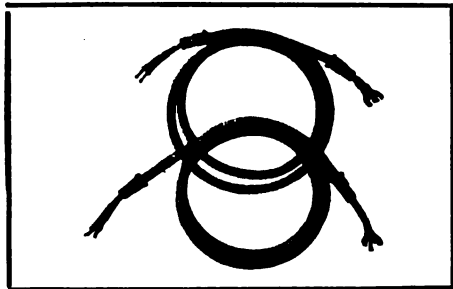
The zinc coating appeals to us and sure worked fine in this case."

Your stock of Zelcos will not shopwear or rust. Every ring is in salable condition at all times.

Ask the Zelco Piston Ring Division, Walter A. Zelnicker Supply Co., Wellston District, St. Louis, Mo., to send you descriptive literature and prices on this new quick-seating piston ring.

Turner Lighting Wire Assembly Attracts Widespread Interest.

A new product being manufactured by the Turner Mfg. Co., of Kokomo, Ind., which has attracted widespread attention



Turner Wiring Assembly for Ford Car.

both among Ford owners and Ford dealers, is the Turner wiring assembly designed for Ford cars.

To begin with, the manufacturers say, it greatly beautifies the car. It eliminates the troubles and dangers resulting from exposed and worn wires. Chaffing of wires and short circuiting are not possible with the Turner wiring assembly. And it is water-proof, oil-proof and grease-proof. Its installation is simple and quick.

This product, it is claimed, prevents burning out of light bulbs from uninsulated wires and does away finally with dim lights resulting from water-soaked wires, expensive road repairs from bare wires shorting magneto and stopping motor, and dead or weak battery from shorted light wires.

Probably the one thing that appeals most to every car owner is the feeling of safety afforded by the use of the Turner wiring assembly. Fires that destroy hundreds of cars are traced to oil and grease-soaked wires and the resulting short circuit. This danger is said to be eliminated entirely.

Motorists May Do Own Battery Charging with "Homcharger."

A very ingenious and timely device for the motorist has been perfected by the Automatic Electrical Devices Co., of 120 W. Third St., Cincinnati, Ohio, which is being marketed under the trade name of "Homcharger."

As its name implies, the Homcharger is a device for charging the starting, lighting and ignition batteries, forming a part of all modern cars, in the motorist's own garage.

Because of the inability of the generator

on a car to keep its batteries fully charged at all times, the average life of a starting battery is less than one year. As present day practice is toward the elimination of the high-tension magneto and the substitution of battery ignition, to say nothing of the various battery-operated accessories, such as spotlights, cigar lighters, etc., this produces a strain upon the battery which cannot be taken care of by the present generators.

This fact is better illustrated by the thousands of battery service stations springing up all over the country, all of which are doing a thriving business in the charging and replacing of motor car batteries.

All service station charging, and at least 50 per cent of the replacements and repairs now made at them, it is claimed, can be eliminated through the use of the Homcharger.

This device is a very small and neat affair, measuring 5½ inches by 7 inches and designed for mounting upon the garage wall. It is attached to the nearest alternating-current lamp socket by means of an ordinary attaching plug.

In order to facilitate the charging of motor car batteries without tearing up the floor boards to attach charging pipes, or without removing the battery from the car, a neat nickel-plated receptacle is furnished, for mounting upon the dash-board, which is connected permanently to the wiring of the car. Connect the Homcharger into this receptacle and the battery immediately starts to charge.

The standard Homcharger, as designed for individual use, will fully charge any ordinary 6 or 12-volt battery over night, at a cost of but four or five cents for current. One such charge per week will keep any battery in "the pink" of condition, thereby greatly increasing its life it is claimed and insuring the user a quick start, bright lights, and perfect ignition at all times.

As the charging rate automatically tapers as the battery becomes charged, no harm results if the battery should be left connected indefinitely. On the contrary, such overcharging tends to break down any sulphating which may exist on battery plates, thereby lengthening its life.

The Homcharger consists of a step-down transformer and a very simple rectifying "valve" which delivers a uni-directional current to the battery. An ammeter is furnished which shows the charging rate at all times, together with a 10-foot charging cable and plug to facilitate connection to the battery.

The rectifying "valve," which is the heart of the Homcharger, is actuated by an entirely new principle which permits of satisfactory operation over a wide variation of frequency, voltage, etc.

But one moving part is used, this being an armature vibrating in a variable magnetic field, actuating two metallic contacts so as to open and close the charging cir-

cuit at definite points during each cycle, thereby delivering to the battery a current of constant polarity.

The armature—the only moving part of the entire device—is not subject to any wear and will last indefinitely. The two contacts which are the only wearing parts, are good for approximately 50,000 hours of operation, and may be replaced when worn out at a moderate cost. This is the only up-keep expense as the transformer, ammeter, etc., will last indefinitely.

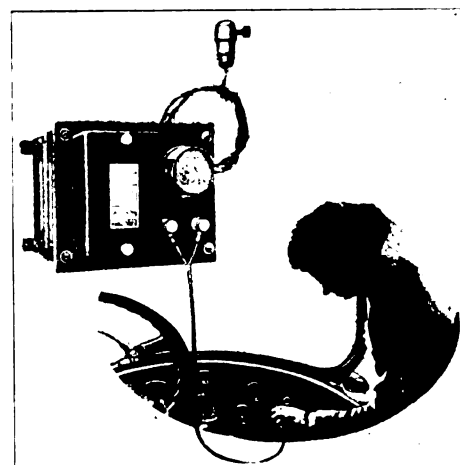
The Homcharger is automatic in every way and entirely fool-proof. Regardless of how the batteries are connected, or the charging plug inserted, the Homcharger will automatically deliver current of the proper polarity, thereby eliminating the possibility of reverse charging.

Should the alternating current supply be interrupted, while batteries are connected, the Homcharger stops, but automatically restarts as soon as the power is restored. As soon as the battery is disconnected from the Homcharger, it automatically stops, thereby permitting the alternating current supply to be left on over an indefinite period without any consumption of current.

When batteries are disconnected, the charging leads may be short circuited, as there is no current flowing through them under such conditions.

The secondary of the transformer is entirely insulated from the primary which eliminates all danger of electric shock and makes the Homcharger absolutely safe, even in the hands of a child.

The Homcharger is manufactured for use on alternating current circuits of all frequencies and voltages and for charging either lead or Edison type cells of the

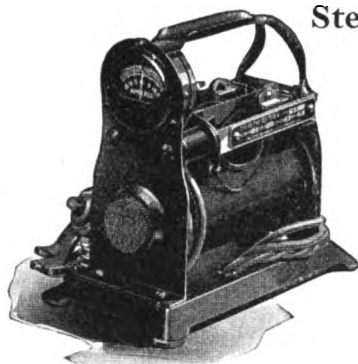


Homcharger is Automatic in Every Way.

sizes ordinarily used for motor-car work. A modified type is also manufactured for use on direct current circuits, and either may be used successfully for charging the smaller sized batteries.

Catalog 5628 issued by the Automatic Electrical Devices Co. describes the Homcharger in detail, and will be sent to anyone interested.

An improved Rectifier for home or garage use—a new addition to the Sterling Line



Will charge an exhausted battery over night

The

Sterling
PORTABLE RECTIFIER

A practical yet inexpensive device for charging automobile storage batteries from alternating current. A rectifier without a weakness, especially designed for home or garage use.

Vibrating reed type. One adjustment moves both carbons simultaneously and secures an even adjustment on both sides of the reed—eliminating arcing—an exclusive Sterling feature. Automatically charges in the right direction regardless of terminal connections. Gives proper taper charge, is economical and easily attached without removing the battery from the car.

Write for Bulletin No. 20

THE Sterling High Rate Cell Tester instantly finds the trouble. It provides an accurate, reliable means of testing the performance of a storage battery without removing the battery from the car. Quickly detects the weak cell. It aids in the immediate sale of new batteries where the old battery is shown to be worn out and prevents fraudulent exchange of rental batteries.

Write for Bulletin No. 10 A

No. 900 STERLING RECTIFIER, Price \$16.00

No. 600 STERLING HIGH RATE CELL TESTER, Price \$8.00

Insist on having Sterling products. If your jobber does not handle them, send your order direct to us stating your jobber's name.

Manufactured by

THE STERLING MANUFACTURING CO.

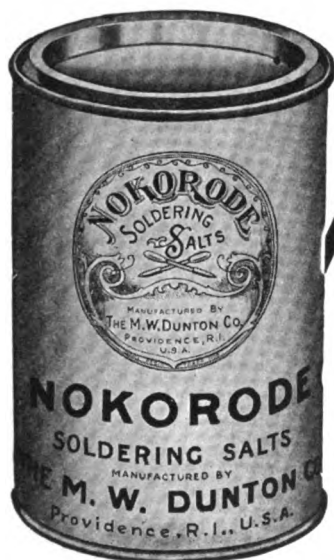
2849 Prospect Ave.

CLEVELAND, OHIO



Sterling High Rate Cell Tester

The Largest Producers of Dash Ammeters in the World



NOKORODE SOLDERING SALTS

As essential as a wrench
in every repair shop

On motor cars and trucks the soldering must be dependable. Defective joints mean breakdowns and often serious accidents. Repairmen who take pride in the character of their work, invariably use NOKORODE SOLDERING SALTS.

NOKORODE makes a bond that will stand the vibration which automotive service involves. It is absolutely non-corrosive and harmless to metals yet is as easily applied as acid. One pound of NOKORODE SALTS cut with a gallon of water will solder all metals and will not burn the mechanic's hands or clothing.

NOKORODE SALTS is extremely economical because a little goes a long way.

Take advantage of our introductory offer and order a trial can, using the coupon below.

For the man who wants a flux in the Paste form, we make the Nokorode Paste.

It is sold under the same guarantee as our Salts. It will not corrode or rust and will solder all metals.

The M. W. Dunton Co.
Providence, R. I. U. S. A.

THE M. W. DUNTON CO.,
670 Eddy St., Providence, R. I.

Gentlemen:—

Enclosed find \$1.00 for which please send me a one pound can of Nokorode Soldering Salts. It is understood that these Soldering Salts will satisfy me in every way, or you will refund my dollar.

Name

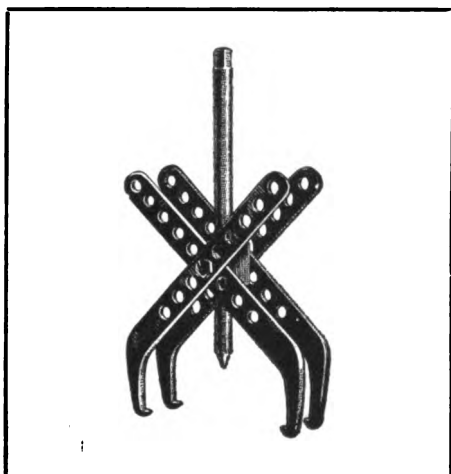
Address

Up-to-the-Minute Garage Equipment

If It's a Hard Job Then You Need a "Big Buster."

Most garagemen are familiar with the "Little Giant" gear and wheel puller—the sturdy little garage tool which produces the maximum efficiency with a minimum of effort.

And now the "Little Giant" has a big



"The Harder the Pull, the Tighter the Grip."

brother, which the manufacturer is calling "Big Buster," and which has been designed to cover a range of work upward from where the "Little Giant" leaves off.

The weight of the "Big Buster" is 100 pounds, and the open adjustment is 40 inches. It will pull heavy motor truck and car wheels, ship and airplane propellers, heavy fly and gear wheels, transmissions, etc., easily. If you have an especially tough job, then you need a "Big Buster."

The "Big Buster" can't slip off the work and no arm locks are required. Patented principle "The harder the pull the tighter the grip."

Write the Premier Electric Co., 3802 Ravenswood Ave., Chicago, for complete details and prices.

Sharper Tools Are Better Tools—Sioux Sharpening Service Free.

"That's what I call 'system and dispatch,'" commented the motorist admiringly, as the mechanic completed the valve reseating job. "You seem to be an expert."

"Not a bad job," admitted the mechanic. "But," he added smilingly, "'A workman is no better than his tools,' you know, and there was a time when valve reseating was a mean task to me. That was before I knew about the Sioux service."

What is the Sioux service? It's a real co-operative service that is free to every garageman and repairman who uses Sioux tools.

Keen-cutting edges and accurate angles

are absolutely necessary in valve reseating tools. Albertson & Co., of Sioux City, Iowa, the company which manufactures the Sioux line of tools, has equipped and maintains a special department for the purpose of giving free sharpening service to all owners of Sioux tools. They will keep your Sioux cutting tools in perfect condition for you at no cost whatsoever except the carrying charges both ways.

Not only that, but the Sioux tools sent in for this service will be resharpened and returned to you the same day that they are received. In this way you can keep your cutting tools in perfect condition. This service, of course, is for users of Sioux tools only—other makes of tools, of course, are not accepted for this sharpening service.

The line of Sioux tools carried by Albertson & Co. is one of particular interest to the garageman and dealer who are inter-

it impossible for the cutter to get out of line.

The tool-holder of the "Little Sioux" valve lathe is adjustable in or out, and there are no up and down adjustments.

It has a circular cutter which is made of a special composition metal that is particularly adapted for cutting hard tungsten steel valves. The circular shape provides unlimited cutting edges.

A "Little Sioux" valve lathe will fit in a vise or can be permanently attached to a bench.

Complete details regarding the Sioux service can be obtained by writing Albertson & Co., Inc., Sioux City, Iowa.

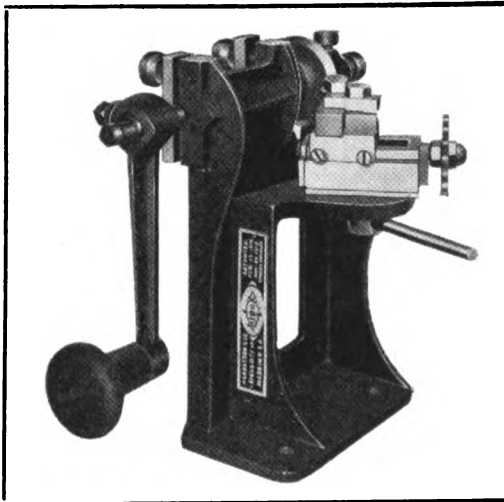
Introducing New Member of Weaver Family—Hi-Lift Jack.

Comfort and efficiency are assured, it is declared, when working under a car, if you have a Weaver Hi-Lift jack.

This new jack is specially designed with an extreme range of lift to elevate either the front or rear of a truck or a passenger car, and also enables the operator to lift the weight of the body of the car from the chassis when lubricating springs, replacing broken spring leaves, worn shackle bolts, etc. It can also be used for lifting light tractors.

In the construction of the Weaver Hi-Lift jack, the cantilever principle of support has been applied. This method supports the lifting arm of the jack at the base only, the lifting arm extending at an angle and leaving free the upper end, upon which the weight rests, thus giving the jack a great range of lift.

The saddle of the jack can be lowered to a minimum height of seven inches, so that it may be applied to the lowest axle and it can be raised to a maximum height of 38 inches. When a greater



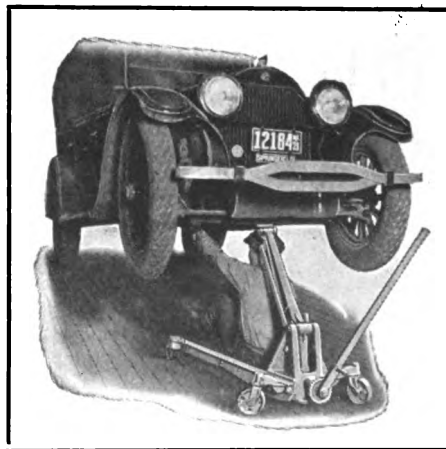
"Little Sioux" Refaces Any Size Valves.

ested in up-to-date and exceptionally meritorious tools. Among them are: Sioux standard valve tools; refacing tools; valve grinders; bushing removers; valve seat reamers; valve grinding attachment for electric, pneumatic or belt-driven devices; and the Sioux valve lathe, which will reface valves either 35 degrees, 45 degrees or 60 degrees and from 1½ inches to 4½ inches in diameter.

There is also the "Little Sioux" valve lathe. This is intended for refacing valves of any size up to 2½ inches. It is a new addition to the Sioux family of high grade tools and is said to be absolutely correct for refacing valves.

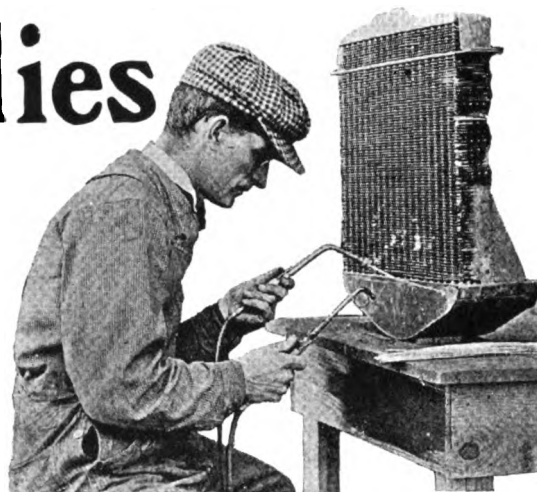
The angles, 30, 45 and 60 degrees, are plainly etched on the graduation plate, which is accurately adjusted by loosening the clamp, moving the adjustment lever over to the degree and setting the clamp again.

The closing of the adjustment lever makes



Hi-Lift Jack Has Great Range of Lift.

Tools and Supplies for AUTOMOBILE RADIATOR REPAIRS



Specialization Makes our Line the Best for You

Years ago we realized that radiator repairing was destined to be one of the most profitable branches of automotive work. Too much of this work has been going to city shops because the local repairman did not have the necessary equipment. Our object is to help small town garages and repairmen to handle all this work themselves and **to get all the profit.**

Our line of tools and supplies for automobile radiator repairing is very complete and of proven merit.

Write today for catalog F.

F. L. CUFMAN MFG. CO.
Maryville, Missouri

A Manual of Instruction on the subject of Auto Radiator Repairing

Written by F. L. Cufman and T. H. Leet, is an invaluable text book which should be in the hands of every repairman who works on radiators; 185 pages—120 illustrations, most of them photographs showing the actual work. Nearly every automobile radiator is described in detail. Proven repair methods are explained.

Order your copy today. Mailed postpaid on receipt of \$2.50.



Flexlume Signs

**Most Forceful
Advertising at
Lowest Cost**

WHEN the spring evenings come, will a Flexlume Electric Sign tell your story to the thousands of motorists driving past? Will it tell them of your car, your tires, your accessories, your service?

There is no way you can get more advertising for your money than in a Flexlume Electric Sign, the kind with the raised snow-

white glass letters. They are day signs as well as night signs. They have greatest reading distance, lowest upkeep cost, most artistic designs, greatest

advertising value. Every day and night a Flexlume will tell your story to thousands at a cost of only a few cents.

Let us send you a sketch showing a Flexlume to meet your particular needs.

FLEXLUME SIGN COMPANY

25 Kail Street

BUFFALO, N. Y.

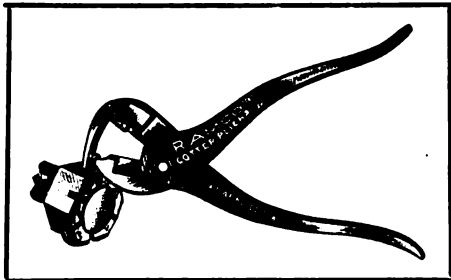
Flexlume-Electric Signs Made Only By The Flexlume Sign Company.

elevation than 38 inches is required, the removable standard can be used. This standard fits into a slot in the saddle and provides an additional height up to seven inches.

An attachment with which the Hi-Lift jack is equipped greatly minimizes the labor and inconvenience of removing and transporting heavy truck wheels. This attachment is supported by the saddle of the lifting arm of the jack and is held securely by two studs which fit into slots in the saddle.

Two lower prongs of the attachment support the wheel and hold it firmly against the two upper arms by means of two adjustable clamps to handle any size tire. It can be placed on the jack and removed from it instantly without the aid of tools. There is plenty of space between the upper arms of the attachment to permit the wheel puller to be used to advantage.

Another conspicuous feature of this jack is its simplicity and ease of operation. The long handle, which gives ample leverage in raising the load, operates a worm which meshes with the gear sector that forms the base of the lifting arm. Downward pres-



Ramco Cotter Pin Pliers Are Timesavers.

sure on the handle from the right elevates the lifting arm; downward pressure from the left lowers it. The arm can be more quickly elevated or lowered to reach the load by turning the crank after removing the long lever handle.

The two wheels nearest the jack handle are mounted on ball and roller bearing castors, enabling the operator to guide the jack easily into any desired position by means of the long lever handle.

Because of the triangular shape of the jack and the angle at which the lifting arm extends, the mechanic has ample space in which to work and can also work directly under the point at which the burden is supported.

The dependable worm and gear sector makes it impossible, it is said, for the load to be accidentally released and also enables the mechanic to work under the car with absolute assurance as to safety.

The construction of the Hi-Lift jack is amply strong to meet the requirements of the service for which it is intended, being of steel and malleable iron throughout. It has a lifting capacity of 3,000 pounds and a maximum width of 40 inches. Its wide range of usefulness makes this jack an important addition to any repairshop, garage or service station.

The Hi-Lift jack is manufactured by the

Weaver Mfg. Co., Springfield, Ill., which also has a Canadian factory at Chatham, Ont. Write for the attractive catalog describing the Weaver line of high-grade garage and shop equipment, including a number of new tools of interest.

Ramco Cotter Pliers and Kil-Nock Adjusters Aid in Repair Work.

Sole manufacturing rights on the Katy Kottor pin pullers have been transferred by the Katy Tool Mfg. Co., of Minneapolis, Minn., to the Ramsey Accessories Mfg. Co., of St. Louis, Mo. These tools will now be sold under the name of Ramco cotter-pin pliers.

Ramco cotter-pin pliers, it is said, will pull cotter pins without straightening, and from any angle. They will also hold the pins after withdrawing them from the bolts. Connecting-rod cotter pins can be pulled in a jiffy. As timesavers, Ramco cotter-pin pliers will be appreciated. They are made from drop-forged steel, tempered.

In addition to the Ramco cotter-pin pliers, this company is introducing the Kil-Nock automatic adjusters for Ford bearings. Your customers will like Kil-Nock adjusters, as they are designed to do away with the expense and bother involved in the adjustment of loose bearings.

Kil-Nock adjusters automatically compensate for the wear in the connecting-rod bearings as the motor is in motion, thus eliminating the necessity for having the bearings taken up.

The spring in the Kil-Nock only keeps the spool nut moving the lower cap upward—it has only four pounds of tension at all times. It makes the tightening of the nut with a wrench unnecessary and keeps the bearing in perfect contact on the crankshaft, eliminating connecting-rod bearing knocks.

Kil-Nocks are being sold at an attractive price and on a money-back guarantee.

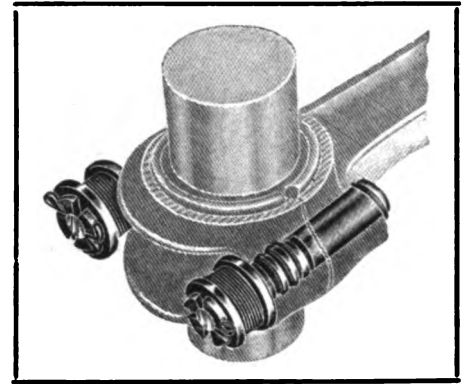
Details and prices will be gladly furnished upon request by Ramsey Accessories Mfg. Co., 1513 N. Broadway, St. Louis, Mo.

Turn-Auto Makes Your Automobile Underwork Repair Easier.

The examination and repair of the underworks of an automobile is usually a job presenting many disagreeable and difficult features.

When the workman must lie on his back under the car, with only a few inches between his nose and the greasy, dirty parts of the machinery, and with very little elbow room, repairwork and cleaning is a laborious and far from satisfactory process.

A most ingenious invention which has just been placed upon the market, and which is designed to eliminate these disagreeable features, is the Turn-Auto which is manufactured by the American Turn-



Kil-nock Bearing Adjusters Stop Knocking.

Auto Co., 40 West Gay St., Columbus, Ohio.

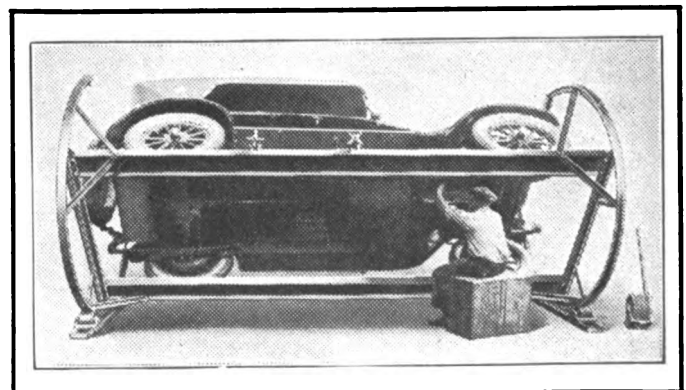
This machine, which has been on the market for 18 months, is an all-steel cradle onto which the car is run either under its own power or, if the engine is "dead," by means of a winch attached to the Turn-Auto. After that the chassis is securely fastened to the track by means of chains or turnbuckles.

A crank attached to the mechanism then rotates the car on its own axis, and this is done without stress or strain. After the automobile has been tilted over into the right position, it is locked and the mechanic can begin his work on it. The Turn-Auto is built firmly and it need not be fastened to the floor in the garage or repairshop.

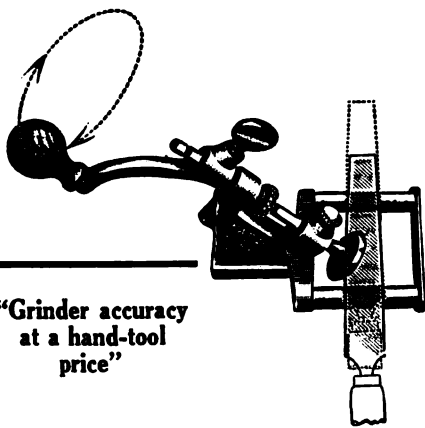
A winch and also a special twin jack are a part of the equipment. The special twin jack, placed under the rear or front of the car before locking, permits the removal of wheels and axles. Where the car is placed and held in position on the Turn-Auto, there is nothing to touch or mar the body of the car or any other part while work is being done on it.

The Turn-Auto is simple in operation and will accommodate cars of any size. It will allow the mechanic to strip the automobile of everything except the chassis frame. It eliminates the use of chain hoists, creepers, inclines and pits.

Where the machine is not lifted by old-



Turn-Auto Accommodates Any Size Car.



"Grinder accuracy
at a hand-tool
price"

SKINNER
Motor
Valve Set

Refacing—the new way

With the refacer in the Skinner Motor Valve Set, valves are rotated against a moving file held to a true plane of 45°, 60° or 30° by two rollers. Enough speed is developed to cut tungsten valves easily while the accurate guide-bearing compels cutting a true seating surface even on a warped valve head.

The reseating part of the Skinner Motor Valve Set includes five 45° cutters taking 1½" to 3½" and four carefully machined pilots. Power and pressure are separate—result, an accurate job ALWAYS. Write for special bulletin.

M. B. SKINNER CO.

558-562 Washington Boulevard

CHICAGO

Buffum Buick Valve Remover

Makes a tough job easy

Lifting the valves of a Buick was a job which all mechanics shunned before the coming of the Buffum Buick Valve Remover—the only tool that will do it properly. The Buffum Tool is quick, safe and sure in operation. Does not break valve cages, nor bend valve washers, valve springs and valve seats.

More Power for the Buick

When the valves are properly cleaned (as they must be from time to time) the Buick runs smoothly and maximum power is possible. The Buffum Buick Valve Remover does away with the hardest part of the work.

Every garage and repair shop should have one as regular equipment. Dealers find them ready sellers to Buick owners, who should carry them, especially in touring, as they may get broken down in the country where a garage might ruin valve cage.

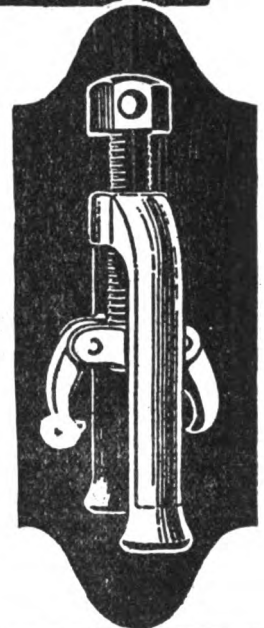
Retail Price \$2.00. Fully guaranteed.

Write for Trade Prices

BUFFUM TOOL CO.

Factory and General Offices

4th and N. Carolina St.
Louisiana, Mo., U. S. A.



A line that
will pay
you to sell

SUPERBESTOS Folded and Stitched BRAKE LINING

outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.

DEALERS and REPAIRMEN—
Write for data and prices on brake lining, clutch facings, Ford Transmission lining, running board mats and packings.

Manufactured by
MIKESELL BROTHERS COMPANY
156 No. La Salle St., Chicago, Illinois
Plant and Works, Wabash, Indiana



Any Car is a Better Car with a Wickey Battery

We want
Dealers —
to stop
Battery Grief

—to do away with expensive "free" service. To sell the battery that does not need the care and attention that other batteries must have. You are invited to sell the most remarkable storage battery ever built: the

WICKEY Semi-Dry Rechargeable Storage Battery

You can make your business more profitable by selling Wickey Batteries, not more profitable from the standpoint of the original sale—but more profitable because after the sale there is no free service necessary.

Responsible business men who are alive to the possibilities of increased battery sales, increased profits, and greater customer's satisfaction are invited to write for full information. We have some desirable territory open for the right men.



Wickey Features

- Semi-dry; no acid or liquid to leak or spill.
- Has no wall separators to give out.
- Plates cannot buckle.
- Needs water only 3 or 4 times a year.
- Will NOT freeze or overheat.
- Guaranteed three years.
- Rechargeable from generator without removal from car when fully discharged.

Write us today for complete details of our proposition to you for handling the Wickey Battery sales in your territory.



There is a Wickey Battery for every car — guaranteed for three years of service

WICKEY BATTERY CO.
730 Exchange Avenue
EAST CHICAGO - IND.

fashioned methods, and where the mechanic must lie on his back and tinker, a lot of time is required. In these days of high cost of labor, time is an important element to reckon with. Where the Turn-Auto is used, the car can be run onto the cradle, fastened and turned over in ten minutes.

Then one man can do the labor and he can stand or sit with the work right before him. He has full freedom for the handling of the tools and he does not have to get all smeared up with oil. Many service stations and garages in this country have already installed the Turn-Auto.

The splendid and cheap inspection service he can give his customers appeals especially

to the man who has a Turn-Auto. At a price of say \$8 a month or so, the car owner can have his machine inspected—and such inspection is essential to the life of the automobile.

There are nuts that need tightening, rods and gears to be overhauled and the mechanism thoroughly cleaned. By such inspection, one may prevent accidents which might result from some faulty part of the car. The least faulty part, if repaired in time, may be the means of saving a \$2,000 or \$10,000 car from total damage. With the aid of the Turn-Auto, the garageman can give inspection service at a reasonable cost and the revenue thus derived will soon pay for the Turn-Auto.

The American Turn-Auto Co., which has opened spacious offices at 40 West Gay St., Columbus, Ohio, advises us that the Turn-Auto can be purchased on time, thus allowing the device to pay for itself.


The factory is centrally located at Bucyrus, Ohio, thus permitting prompt shipments to all points in the United States.

Paragraph.

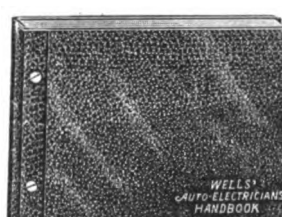
THE NATIONAL REFINING Co., Cleveland, Ohio, brought all its division managers from all parts of the United States to the general offices at Cleveland during the week beginning January 30, for a week of analysis of business conditions, at which sales and advertising policies were also discussed



STAR GLASS WINDSHIELD WINGS
Clear, Amber and Green Glass—No Holes in Glass
Successfully on the market over two years.
Write for particulars
STAR WING CO., 170 W. Randolph St., CHICAGO



ROMORL
AIR and WATER STATION
"Pays You a Perpetual Profit"
Because it continually brings you new customers. Its attractiveness catches the eye of the approaching motorist and its evident cleanliness and efficiency induces them to stop when in need of air and water. And where they stop for convenience they go to buy.
Built in five styles for all requirements.
Write our sales Department today for full details.
Manufacturers
The Romorl Mfg. Co.
Oakfield, Wisconsin
Sales Dept.
The Zinke Company
1329 Michigan Ave.
Chicago, Ill.
Model 8-D



Does Your Auto-Electric Service Sell Results, or Only Your Hours of Work?

It's a simple case of add and subtract—
One Hour's Time (plus Wells' Auto-Electricians' Handbook)\$4.50
One Hour's Time (plus Lots of Hard Work and Worry) 1.50
Are you losing, or do you want to make the difference of\$3.00
There are forty reasons why Wells' Handbook is the biggest money maker in the electric service shop—here are three of them:

First— PERFORMANCE, ADJUSTMENTS, TEST METHODS, CONSTRUCTION. From 1911 to now, on 1324 models of 270 different makes of cars, for their GENERATORS, MOTORS, REGULATORS, CUT-OUTS.

Second— Real working diagrams, in blue print, of the internal wiring of each unit—with every brush, coil and terminal shown in its actual position as in the machine.

Third— Exact and specific instructions for each different make of machine—with real "brass-tack" information and no glittering generalities.

Do you want to know HOW and WHY Wells' Auto-Electricians' Handbook will make money for YOUR shop?

Then write today for sample pages and a complete description.

It's easy to buy—and easy to pay for, too.


AUTOMOTIVE PUBLISHING CO.
448 S. Dearborn St., Chicago, Ill.

LET'S HAVE THAT NEXT ORDER!

**When you need a Doctor
Do you get estimates?**

NO! you engage a Physician in whom you have confidence. That's why you use F.A.A. ALUMINUM and CAST IRON MENDS. You have confidence in them in making permanent repairs, such as scored cylinders, cracked water jackets and aluminum castings.

**F. A. A. Aluminum and Cast Iron
Mends go straight to the job.**



**Distributors—Dealers—Agents
WANTED**

F. A. ALBERTUS & CO.
206 Ninth Street, Milwaukee, Wis.
Western Distributor
CARL M. ANDERSON, Vineburg, California

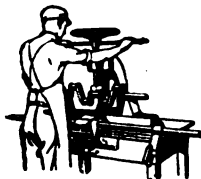
CONTINENTAL

"The Efficiency Standard"

SHOP EQUIPMENT

The Continental Line

Motor Stand
Ford Engine Stand
Assembly Table
Welding Table
Battery Stand
Radiator Stand
Axle Stand
Creeper
Spindle Arm
Pushing Press
Crank and Camshaft
Straightening Press
Piston Vise
Riveting Jig
Piston Aligning Device
Parts and Tool Tray
Wrecking Truck
Burning-in Machine
Gear Pullers
Universal Straightening Press
Ford Assembly Table
Portable Work Bench
Propeller Stands



Universal Straightening Press

Designed for all kinds of straightening work, from factory requirements to garage and service station work. The dial indicator shows you to one-thousandth of an inch. It's a member of the Continental equipment family.

Write for catalogue of complete line.
The Best Garages use Continental Equipment



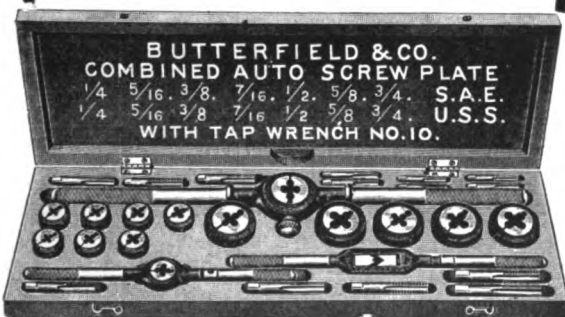
CONTINENTAL AUTO PARTS COMPANY

MANUFACTURERS OF ALL TYPES OF
EQUIPMENT FOR GARAGES AND FACTORIES
EQUIPMENT

BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



Set shown in illustration enjoys a well deserved popularity in the automotive field. Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each. Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

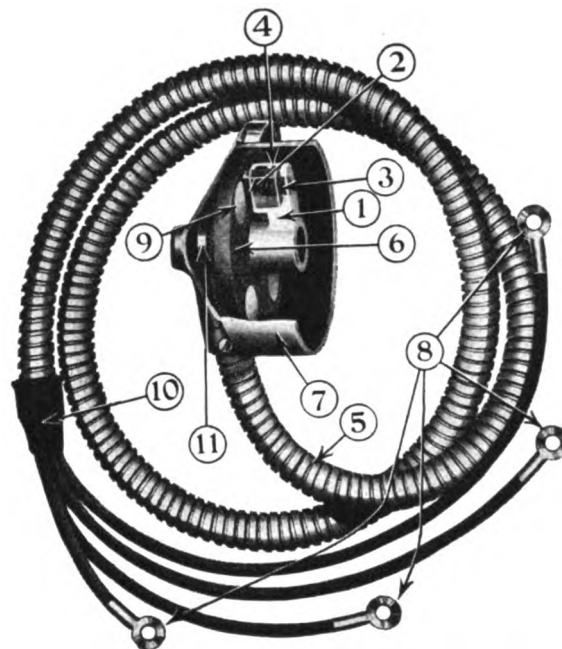
Union Twist Drill Co.

62 Rende Street NEW YORK, N. Y.
11 South Clinton St., Chicago, Ill.

THE TURNER

2 IN 1

TIMER



A fast selling product that will give lasting satisfaction to every Ford owner. Made for Ford cars, trucks and tractors. Assures an easy start in any weather, lessens fouling of two front plugs, saves gasoline, stops "kicking", is oil, grease and water-proof. Requires no oiling and is easily installed.

1—Brush container is of special alloy metal, and will last indefinitely. 2—Contact brush of specially treated phosphor bronze. 3—Contact spring is of high grade piano wire telescoping type. 4—Stop pin which holds brush in place. 5—Flexible metal conduit cord packed; which entirely houses all wires. 6—Genuine Bakelite insulated Timing Disc. 7—Timer shell of aluminum. 8—Note the four different lengths of wires, the only wires that you have to connect. 9—Hardened brass contacts of best quality are used. 10—Snug fitting rubber Nipple. 11—Hub inclosure for wire protection. Timer and wire assembly complete\$3.60

TURNER SPRING LEAF SPREADER AND LUBRICATOR



—Greatly increases riding qualities of any car, stops squeaks and spring breakage and increases spring wear. Makes steering easier and saves tires. The only device made that spreads spring leaves and lubricates them in one operation without fuss or muss. The grease goes just where it is needed and nowhere else. For all cars. Price\$2.50

For convenience of car owners we furnish one pound cans of special spring lubricant for use with our lubricator. Price\$1.50

TURNER FORD FOOT ACCELERATOR

A positive, simple, durable, inexpensive foot throttle. Installed by anyone in 10 minutes. Permits use of both hands in driving. Price complete with foot rest \$1

TURNER MANUFACTURING CO.
KOKOMO, INDIANA



MAKE MORE MONEY

TORIT ACETYLENE TORCH No. 13

For soldering, heating, melting, tempering, auto radiator repairing, battery repair work, and for all kinds of small jobs requiring a hot flame instantly.

An improved method—saving time and affording greater convenience over old methods of using gasoline, kerosene or charcoal.

For garages, electricians, dentists, jewelers and every kind of repair shop.

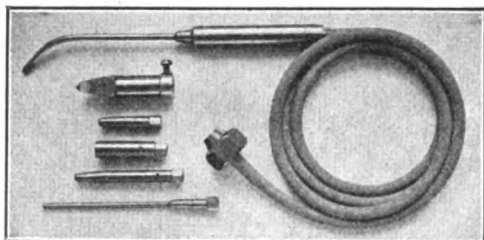
USES ACETYLENE GAS ONLY

A splendid use for discarded auto tanks, and a profitable investment.

Torch with 4 tips for different kinds of work, soldering copper, 5 ft. tubing and connection for auto-acetylene tank. **750**

Order from your jobber. If he cannot supply you send your order to us.

ST. PAUL WELDING & MFG. CO., 165 W. 3rd St., ST. PAUL, MINN.



O'BRIEN HEAVY DUTY GREASE PUMP

makes the handling of grease
SWIFT — CLEAN — EASY — SURE

One man greases any differential or transmission in two or three minutes.

No grease is spilled on car, floor, hands or clothes. Delivers 1/2 pound per stroke. Indicator shows amount used.

Sold on money back guarantee.

Joe Puro Co.

1406 S. Michigan Ave. Chicago



REPAIR SHOPS

\$50 Starts You in the Business of Repairing Scored Cylinders and Cracked Water Jackets.

Start in this highly profitable business now by using the Bull Dog patented process and tool equipment for repairing scored cylinders and cracked water jackets without preheating or welding and make from \$8.00 to \$10.00 per hour. Write for our special proposition "D".

METALS REPAIR & SUPPLY CO., Inc.
1525 Fourteenth Street, N. W. Washington, D. C.

WATERVLIT SPIRAL EXPANSION REAMERS



Specially designed for Piston Pin Work on every make of car and truck.

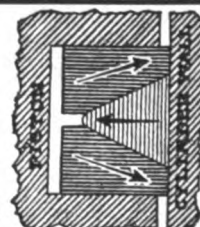
They Will Not Chatter!

Give a full bearing surface with a mirror-like finish.

Ask your jobber about them
Schedule mailed on request

WATERVLIT TOOL CO., Inc., Albany, N. Y.

V-Plex Piston Rings



A Few Agencies Still Open

REPUTABLE mechanics know the value of side expanding rings. This statement is proven by our large business with repair dealers.

Over 90% of sales are repeat orders.

V-Plex rings embody many other special features of particu-

lar importance—may we explain them to you?

Exclusive county and sectional representatives for this remarkable, self-adjusting-to-wear-in-all-directions ring are being appointed. Possibly the agency for your district has not yet been assigned. Find out. Write now.

KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL.

You Don't Guess the Answer

You READ it on the Blade

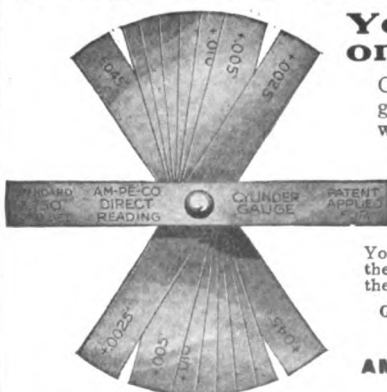
Cylinder measurements guaranteed accurate to within .00025" and less.

The AM-PE-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

Get the whole story in our circular.
PRICE \$2.50

AM-PE-CO SALES CO.
Marshalltown, Iowa





A Line That Gets BETTER Every Year

Standard and Duplex Bumpers
De Luxe all metal Vizer
"Better" Replacement Springs
Tire Carriers—various kinds

Durability, practical usefulness, up-to-dateness, good looks and strong guarantees have popularized New Era accessories with car owners.

Jobbers and dealers have found them fast turn-over merchandise, easy to handle, and permanent customer makers.

Write for catalogs illustrating this line and giving you its strong selling points.

New Era Spring & Specialty Co.
56 Cottage Grove Ave. Grand Rapids, Mich.

KENDALL

Most Perfected Piston Rings

20 Reasons Why

1. Two-piece simplicity, of scientific construction, very easily installed.
2. Long wearing quality.
3. Non-clogging oil wiping feature.
4. No carboning or sticking in the grooves.
5. Our own special formula of soft grey iron used in no other ring.
6. Impossible to score cylinder when properly installed.
7. Perfected 'even-radius'-type, having even expansion every thirty degrees of the entire circle.
8. Absolutely stop oil pumping.
9. 55 degree angle construction relieves groove pressure and increases pressure on the circumference and lengthens life of expansion ring.
10. Soft iron in packing ring yieldable at all points fitting worn and out-of-round spots in cylinder wall.
11. Prevents excessive smoking.
12. Eliminates gasoline seepage by the piston which dilutes cylinder oil, causing loose bearings and knocks.
13. Blow-by an impossibility.
14. Centralize pistons at all points.
15. Maximum compression with minimum friction.
16. Rapid-seating feature on packing ring.
17. 20% saving on gasoline and cylinder oil.
18. No deepening of ring grooves, drilling of pistons or oil regulations necessary, no springs to wear out or pins to get out of place.
19. Froelaimed by Motor Engineers to be scientifically and mechanically correct.
20. Sold with a money-back Guarantee.

Price \$1.00 per ring up to 4"

*Distributors Propositions
Available Write or Wire*

KENDALL ENGINEERING COMPANY
Fort Wayne, Indiana

J. NEWTON BODDY

*Auditor, Accountant, Systematizer
Specialist in Automotive Accounting*

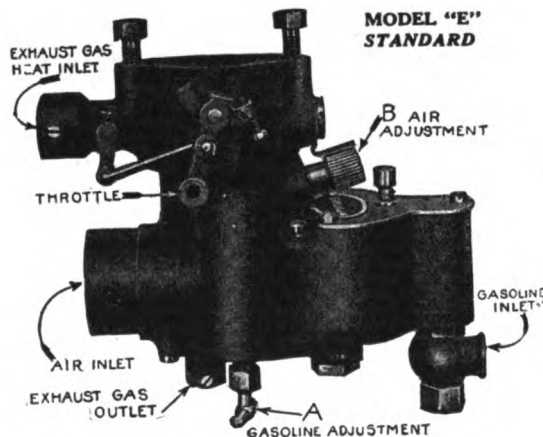
**Audits, Investigations, Surveys, Systems
Income Tax Reports**

**Monthly Balance Sheets and
Operating Statements Prepared.**
Unit and Process Costs Established.

322 South Fourth Street
Phone Atlantic 1816
Minneapolis, Minn.

Cash Journals, Sales Journals, Ledger Leaves,
Purchase Journals, Car Records, Truck Records,
Storage Tags, Shop Cards, Duplicate Statements,
Special Forms, Purchase Orders, Invoices,
Sales Books, Blank Books, Loose Leaf Binders.

*We Specialize in Systems for Automotive
Dealers*



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.
FLINT, MICHIGAN, U. S. A.

Universal Service Order

Are you getting paid for all your Material and Labor on repair jobs?

The Universal Service Order will enable you to check up each job to see if everything has been charged and will show you the profit on material and labor on each sale.

The most complete Service Order on the market.

SEND FOR SAMPLE AND PRICES

We specialize in Accounting Forms for Garages and Automobile Dealers and can furnish you with the right forms to cover your requirements. Write our service department for advice on all your accounting problems.

WRITE TODAY.

Universal Accounting Systems
1825 F Street, N. W. WASHINGTON, D. C.

YAGER'S

Trade Mark Registered

SOLDERING SALTS

for soldering all metals—just dissolve in water and the flux is ready. Harmless, quick-acting — just the thing for automobile repairs.

Buy it from your jobber in $\frac{1}{2}$ lb., 1 lb., and 5 lb. cans.

New Prices for 1922.

ALEX. R. BENSON CO., Inc.
Hudson New York



The Boe Double Action Grease Pump

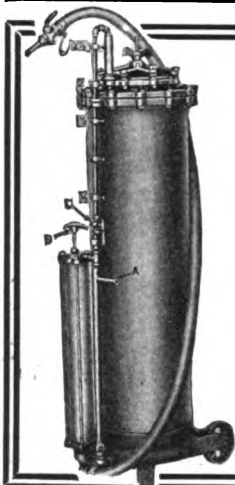
Operates by forced air pressure or by hand or by a combination of both.

Accurate as a scale. Adjustable "visible" measuring. Indicator "B" travels nearly 8 inches for 1 lb. or pt. Can be set to dispense any exact quantity desired.

Will handle 30 pounds of silent gear grease in one minute.

Ask about our 15 other pump outfits. Biggest line of its kind.

BOE MANUFACTURING CO.
MINNEAPOLIS, MINN.



INSTANSEAT

seat instantly

PISTON RINGS

Dealers say—"It pays to handle INSTANSEAT rings because:

Customers desire quick results—
Preventing passage of excess oil guarantees against come-back jobs—

Individual virgin grey iron castings insure good results after long usage—
and because

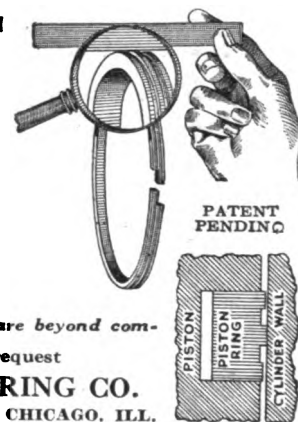
Quality, prices, and discounts are beyond comparison.

Sample ring mailed on request

KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL.



First Aid to Motor Ignition

When spark plugs are worn out or the insulation is broken there is still a lot of good service in them if equipped with

I-X-L Spark Plug Intensifiers

They overcome spark plug troubles

Plugs that have become fouled with grease or carbon, or have broken porcelains fire perfectly when equipped with them.

An important advantage of the I-X-L Intensifier is that you can see the spark from any angle. If the spark does not show the motorist knows that the battery or magneto is not delivering the proper current. I-X-L Spark Plug Intensifiers are adjustable—they make a hotter explosion, increasing engine power and keeping the cylinders free from carbon. They increase the mileage on every gallon of gasoline used.

Prices are extremely moderate. Dealer profits are liberal.

Write today for full particulars.

UNIVERSAL MFG. & SALES CO.
550 W. Harrison St. Chicago



STORM CYLINDER REBORING MACHINES

World's Standard for Speed Accuracy and Reliability

Made in All Sizes from Small Hand Tools to Large Vertical Boring, Burnishing and Milling Machines.

Facilities to Meet Your Requirements.

Write Today for Complete Catalog Covering Storm Equipment

STORM MFG. COMPANY

Dept. E. Minneapolis, Minn.



Winter Sales

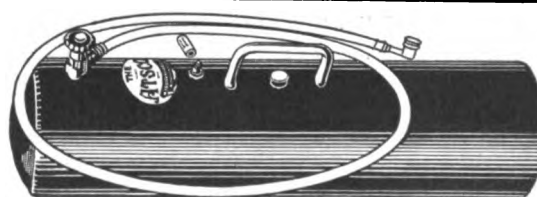
You can "cash in big" by replacing Ford radiators that have been cracked and burst through freezing with JAFFE RADIATORS.

The JAFFE \$100.00 Reward Guarantee has a wonderful appeal for your customers. It is the greatest selling feature ever offered the trade. It means big JAFFE sales for you.

Write for our Yellow Book and proposition
Jaffe Radiator Co.
741 W. Van Buren St., Dept. 4
CHICAGO, ILL.

\$100.00 REWARD!

The JAFFE RADIATOR COMPANY will pay \$100.00 reward to anyone who can prove that the core of any JAFFE radiator can be damaged by freezing.




You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

Pittsburgh, Pa.



Mends punctures and blow-outs TO STAY MENDEED.

This is the original, the genuine, no heat, no cement, no gasoline inner tube repair. Patents, fully covering process, pending.

Notice—Dealers who are interested in securing the most profitable and aggressive sales co-operation ever offered on an automobile product will please write direct to manufacturers.

ROBERT M. BOWES CO., INDIANAPOLIS

"PRO-TEX-OIL" THE MIRACLE LUBRICANT

**FOR FORD CARS
and FORD TRUCKS**

"PRO-TEX-OIL" is a high grade, natural, rich automobile oil, refined from Pennsylvania Crude, manufactured and compounded in such a way as to permit it to retain a larger percentage of lubricating fat than through the ordinary refining process. Through the process in which we manufacture this oil, it retains its natural lubricating fat which greatly improves the lubricating qualities and accomplishes its most important object which is THE ABSOLUTE ELIMINATION OF CHATTERING in Ford cars and Ford trucks.

It is a known fact that by not stopping this chattering when you have the means of doing so (using our "PRO-TEX-OIL") you are absolutely shaking your Ford car into the repair shop and this means a big additional expense.

By eliminating the chattering you eliminate the loose bolts and nuts in all parts of the Ford car or truck. Practically all transmission troubles and rear axle troubles are caused by this unnecessary chattering.

"PRO-TEX-OIL" eliminates the changing of brake-bands to stop the chattering. The result is that PRO-TEX-OIL will give more mileage on oil and gasoline, more power, no excess carbon, and the absolute elimination of the

annoying succession of jerks and jars you get every time you brake down your car or reverse it.

A Ford car or truck is usually selected from the standpoint of economy and it really lives up to its reputation in this respect. Automobile Oil is practically the most important part of your car, therefore, our "PRO-TEX-OIL" is the most important and should have first consideration.

"PRO-TEX-OIL" IS THE GREATEST SHOCK ABSORBER OF THEM ALL—absolutely no annoyance from bumps and shocks when applying the brakes if you use our "PRO-TEX-OIL" for your Ford cars or trucks.

OUR GUARANTEE

"PRO-TEX-OIL" is guaranteed to immediately stop the chattering in the brake-bands, to increase the power and leave no excess carbon residue. By that we mean the carbon residue from PRO-TEX-OIL is less than that from other oils as "PRO-TEX-OIL" is refined from Pennsylvania Crude.

"PRO-TEX-OIL" is the greatest achievement in Ford automobile lubrication.

Dealers and Jobbers Wanted: Territory going fast; write or telegraph for territory.

THE REPUBLIC PRODUCTS COMPANY

**PROSPECT BUILDING
CLEVELAND, OHIO, U. S. A.**

DOUBLE LATTICE TRUSS

Guaranteed to Carry Any Snow Load

For the new garage, or the old one that is being remodeled, this makes the strongest and sightliest construction. Adaptable to spans up to 125 feet—eliminates all posts. Constructed right on the ground where the building is going up. Write for complete information.

LEO McDANIEL CONTRACTING AND ENGINEERING CO.
218-220-222 NINTH ST. CAIRO, ILLINOIS

Guaranteed Repairs and Replacements—Any Make or Type Magneto--Generator--Starter **DISTRIBUTORS—JOBBER**

Briggs and Stratton Co.—Basco Cutouts—Switches—Panels. Connecticut Ignition—Atwater-Kent Ignition—Lighting—Starting. Link-Belt Silent Chains. National Carbon Company—Pyramid Brushes. Eclipse Machine Company—Bendix Drives and Parts. Ray Storage Batteries—Guaranteed Unconditionally Two Years.

Official Service Station: Bosch Magnetos—Starting and Lighting Systems.

Gray and Davis Starting and Lighting Systems.

Authorized Dealer Delco-Remy Starting—Lighting—Ignition

SERVICE BY THE GOLDEN RULE

SAMPSON ELECTRIC COMPANY
— STARTING - LIGHTING - IGNITION —
2334 - 36 SO. WABASH AVENUE, CHICAGO

The Garage *and* Shop Market Place

24-Hour Service

(B-N) PISTON PINS

B-N Jobbers give prompt, efficient 24-hour service—the kind of service that helps you please your customer and get his car in service again quickly. This is because B-N Jobbers are selected with care—must satisfy us on these points—

Willingness and Ability to carry a complete stock
Location such that repair shops can get 24 hour service
Organization to make immediate deliveries without mistakes

These are the approved **(B-N)** Jobbers—order from them—

Atlanta, Ga.
 Pasco Tool Co.
 Baltimore, Md.
 Baltimore Gas Light Co.
 Bridgeport, Conn.
 J. H. Cohen Co.
 Brooklyn, N. Y.
 E. Krieger & Son.
 Charleston, S. C.
 C. D. Franke & Co., Inc.
 Chicago, Ill.
 E. D. Kimball & Co.
 Cincinnati, Ohio
 Julius J. Bantlin Co.
 Columbus, Ohio
 Litters Motor Machine Shop
 Davenport, Ia.
 Sieg Company
 Dubuque, Ia.
 Midwest Auto Supply Co.
 Ft. Wayne, Ind.
 Ft. Wayne Iron Store Co.
 Indianapolis, Ind.
 Homer A. Keller Co.
 Jacksonville, Fla.
 Auto Parts Co.
 Joplin, Mo.
 Joplin Supply Co.

Lincoln, Neb.
 Nebraska Buick Auto Co.
 Louisville, Ky.
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 Lynchburg, Va.
 Barker-Jennings Hdwe. Co.
 Marion, Ohio
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 Montgomery, Ala.
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 Newark, N. J.
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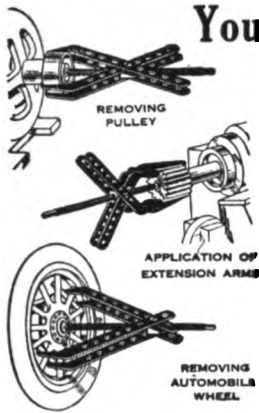
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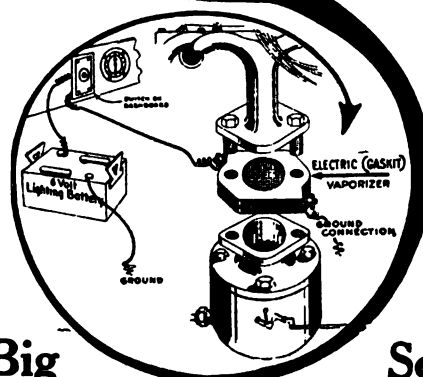
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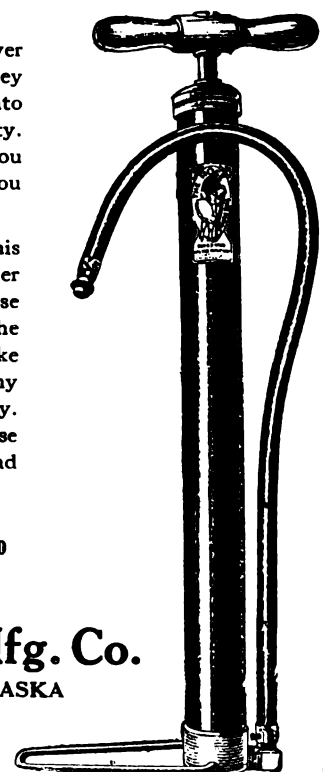
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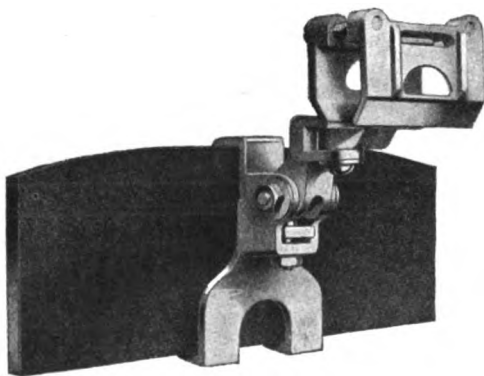
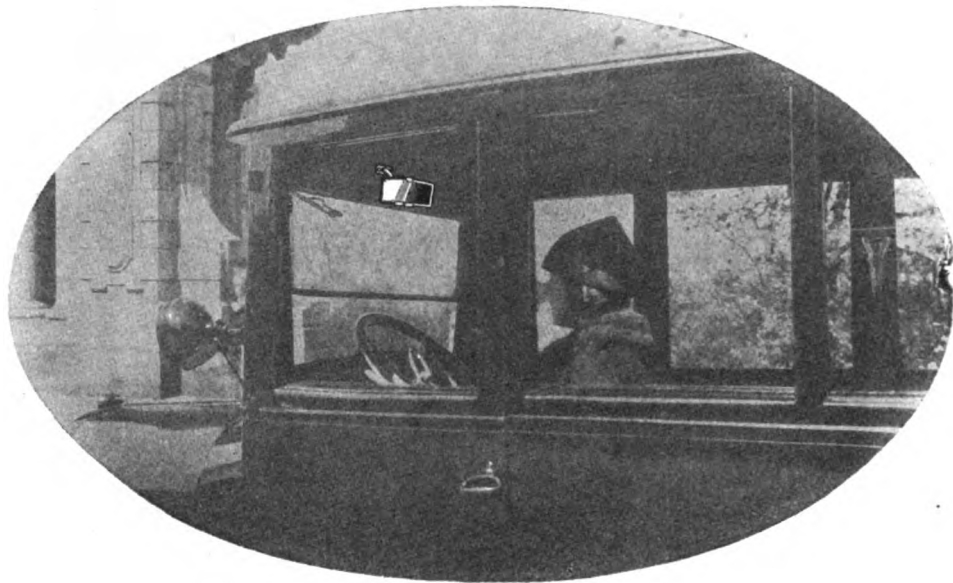
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SPRINGS**
 MANUFACTURERS AND SPRING SERVICE
GARDEN CITY SPRING WORKS
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Model A—Style No. 1—Oval, 8 x 2 3/4"

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Price, \$5.00.



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and stays there*

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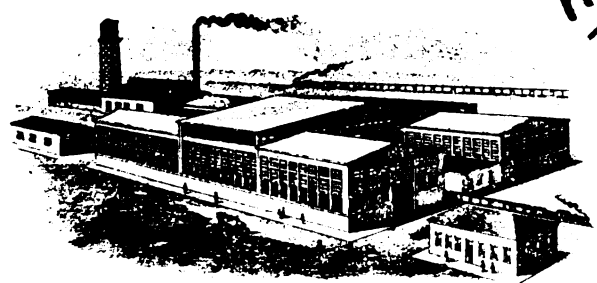
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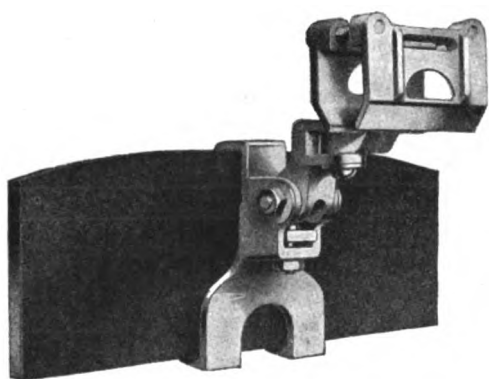
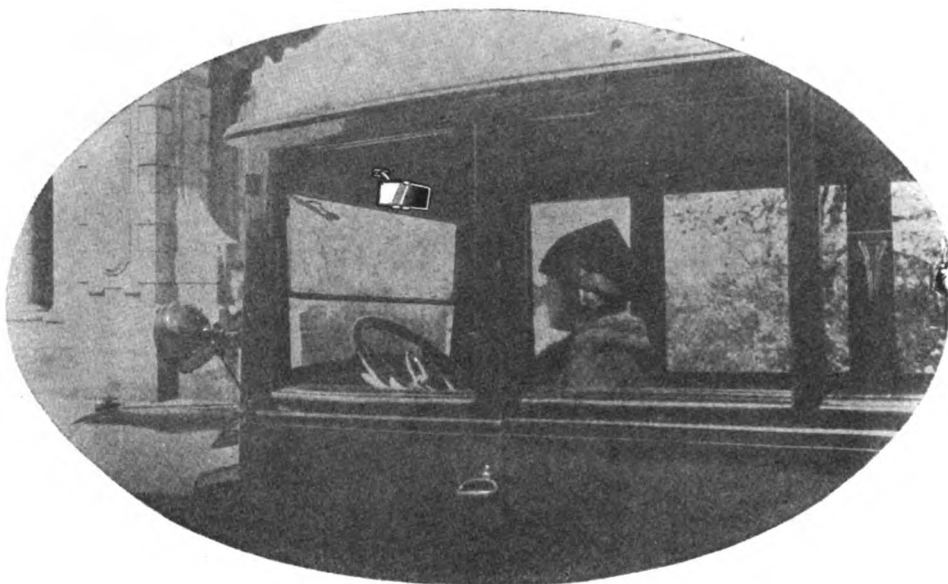


Exclusive Piston Ring Plant



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ST. LOUIS, U.S.A.

The Quality Mirror



Model A—Style No. 1—Oval, 8 x 2 3/4"

Made especially to fit the center windshield frame of all touring and open cars. Faces the driver for rear or side views. Reversible with windshield open or closed or top up or down. The lock-clamp will fit any universal windshield frame, oval, round or square and holds securely.

Price, \$5.00.

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*Adjustable to any angle—
and stays there*

The CHIEF AUTO MIRROR will build a more satisfactory and profitable mirror business because it eliminates all the objectionable features heretofore associated with mirror merchandise in construction and design.

Made of extra heavy quality French crystal, with a non-reflecting, slightly beveled edge. No tinware frame that rusts and rattles, but *ingeniously designed clamps* providing unobstructed vision on the entire mirror.

Every bracket is interchangeable so you can fit any model, open or closed. The brackets are made of the best quality aluminum composition, highly polished and will not discolor, rattle or deteriorate. In appearance, alone, this mirror is without competition.

Lists from \$4.00 to \$5.00

Descriptive catalogue and discounts mailed on receipt of the name of your jobber.



This trade mark protects the dealer against substitution and guarantees the Chief to the owner.

Britton Auto Products Co., Inc.

**119 WEST 63rd STREET
NEW YORK CITY**

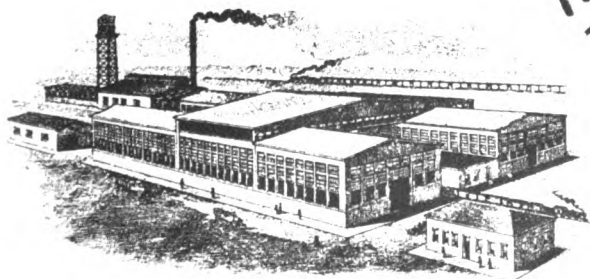
*The Marvel
of
1922*

*An
entirely
new
idea*

ZELCO

IN 100% PIECE PISTON RING Coated

45¢ each
Embraces
all there is in a
one piece ring
Everybody
owns
Power by increased
motor smooth running
Zelco's are installed
from the hour
offer
to sales resistance
appearance sells
performance
keeps them sold



Exclusive Piston Ring Plant



WELLSTON DISTRICT
ST. LOUIS, U.S.A.

SPEE-DEE

CLEANS EVERYTHING



Hands can be washed with Speed-Dee without water. No grit—no acid—no lye. No bad effects.



Mechanics like Speed-Dee. It quickly cuts grease and grime. Can be used with water if desired.



A boon to the housewife for cleaning floors, wood work, etc.



Quickly removes dirt from rugs and carpets and restores freshness of colors.

EVERY man or woman who comes into your store is a direct prospect for Speed-Dee. Everybody needs Speed-Dee—particularly car owners and mechanics. There's nothing else you could stock that has a more universal market.

It's no trick to sell Speed-Dee. A few cans displayed on the counter, in the show case or in the window will start the sales coming and keep them coming. It's not a question of *selling* people—it's just a matter of *reminding* them.

Our national advertising campaign will soon be running in 2600 selected newspapers as well as the Saturday Evening Post and Literary Digest. Millions of people will read this advertising and the demand for Speed-Dee will be even bigger and more permanent than ever. The dealers who stock Speed-Dee will cash in heavily on this demand. The first sale will bring many more—because everyone who uses Speed-Dee once comes back again and again for more.

Get going on Speed-Dee. You'll find it one of the best little profit makers in your store. Write for special introductory offer and dealer selling helps.

STATES CHEMICAL CO.
680 W. AUSTIN AVE. CHICAGO, U. S. A.

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

MARCH, 1922

Vol. 13—No. 3.
10 Cents the Copy.
\$1.00 Per Year.



A Friend in Need

Over a million motorists carry the simple Shaler Vulcanizer for emergency use in making quick, permanent tube repairs—at home or on the road. It is the greatest convenience ever invented for the motorist.

The Best Selling Accessory

Every demonstration makes a sale—because every motorist wants the Shaler 5 Minute Vulcanizer, just as soon as he sees how easy it is to make quick, permanent tube repairs with it. Every sale makes a steady customer for you, as every user will come back for extra Patch & Heat Units to use with his Shaler. Each sale brings a chain of sales on which you make a good profit every month in the year.

ALL JOBBERS SELL IT — WRITE FOR WINDOW DISPLAY

The Shaler 5 Minute Vulcanizer also repairs rubbers, rubber boots, hot water bottles, rubber gloves, coats, etc.

The Complete Outfit includes the vulcanizer and 12 Patch & Heat Units (6 round for punctures and 6 oblong for cuts) and retails for \$1.50—except west of the Rockies and in Canada. Extra Patch & Heat Units retail for 75 cents a dozen. Write now—for our new Window Display, Counter Display, Circulars and other Dealers' Sales Helps—Dealers' Discounts, etc.

C. A. SHALER CO.
352 Fourth St., Waupun, Wisconsin

The Shaler has not only made vulcanizing simpler, and decidedly cheaper, but is automatic in action and so easy to use that any motorist can make perfect, heat vulcanized tube repairs with it, anywhere on the road, in 5 minutes. It saves time, prevents delays, makes tubes last longer. The Shaler makes a strong, durable, permanent tube repair that can't come off—stronger than the tube itself. It's easier than sticking on a temporary cold patch—quicker than changing tubes.



CHAMPION AIR COMPRESSORS

This air compressor is "the finished product" of years of long experience—made by air compressor specialists. There's none better than the "Champion." **A compressor worthy of its name.**

These are some of its attractive features:

Valves: Mushroom Type, housed in bronze cages. Special arrangement for regrinding.

Crank-Shaft: Drop forged, $1\frac{1}{4}$ inches in diameter.

Connecting Rod Bearing: $1\frac{1}{4} \times 1\frac{3}{4}$ inches, bronze back, babbitt lined.

Main Bearings: Hess-Bright ball bearing.

Connecting Rod: I-Beam type with inserted wrist pin bushing.

Lubrication: Automatic splash insures perfect lubrication.

Fly Wheel: Balanced crowned fan blade type of ample size to assure perfect cooling.

Automatic Pressure Release: Eliminates the cause of burned out motors, fuses, etc.

Champion Air and Water Stand

This was one of our biggest sellers during 1921. Service and Filling Stations which take pride in their appearances, will appreciate this attractively designed stand for it will make the motorists pause and say, "Guess I need some more air and water." It's a **business getter!**

The Champion stand does not soil customer's hands or clothing because the "Champion" is "clean." Both air and water hose hang clear of ground when not in use. Arm through which air hose passes, automatically and gradually returns to vertical position when user releases hose. When in use air hose can be attached to each car wheel and radiator can be filled without moving car.

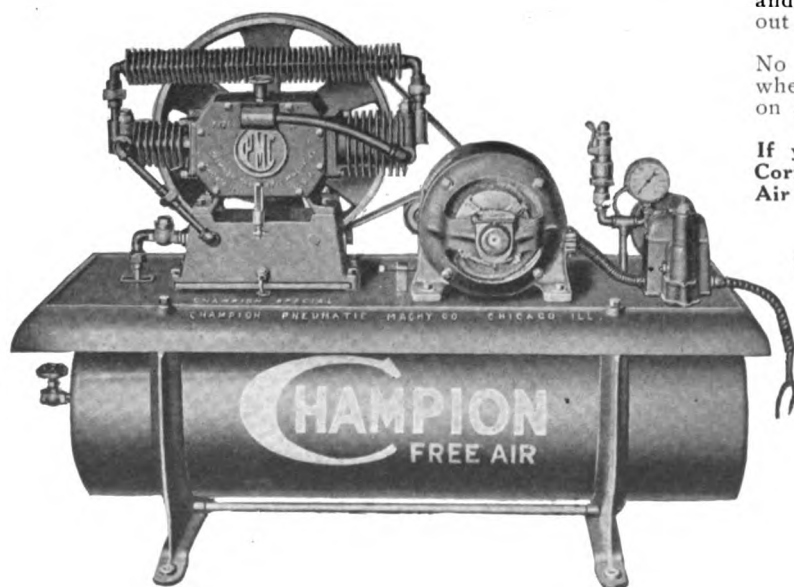
No interference with traffic when "Champion" is installed on curb.

If you want to be the "Busy Corner Garage" install Champion Air Compressor Service.

Write for No. 15 Catalog.

Champion Pneumatic Machinery Co.

1400 S. Michigan Ave., CHICAGO



Sell More Cars

Form 74

SERVICE CUSTOMER

NAME Carl Linch ADDRESS 2720 Shuman Road TEL. NO. 3389

TYPE OF CAR Sedan MOTOR NO. 24196 DELIVERY DATE Jan 5 SALESMAN Bruce

SERVICE CALLS (DATE)

WHAT FURTHER PURCHASES IS CUSTOMER INTERESTED IN: None

PROSPECTS OBTAINED Three

| DATE | R. O. NO. | AMOUNT |
|----------|-----------|--------|
| Jan 1451 | | 6.00 |
| Jan 2106 | | 3.50 |
| Mar 2310 | | 9.00 |

Reverse Side

Full Size
4 x 5 inches

CAR PROSPECT CARD

NAME Carl Linch DATE Nov 24 1921

ADDRESS (RES.) 2720 Shuman Road BUSINESS 105 N. 7th St.

PHONE NO. (RES.) 3389 (BUS.) Qlin 6995 OCCUPATION Inspector AGE 30

TYPE WANTED Sedan MAKE OF CAR OWNED _____ TRADE-IN VAL. \$ _____ OFFERED \$ _____ ASKED \$ _____

HOW WAS PROSPECT OBTAINED Camera SALESMAN J. B. Bruce

SPECIAL INFORMATION

| DATE OF CALL | CALL | CHANCE TO CLOSE | INTERVIEW | RECORD | DATE AND BEST TIME TO FOLLOW | WHAT IS MOST IMPORTANT POINT ON WHICH SALE DEPENDS | RESULT OF INTERVIEW |
|--------------|------|-----------------|-----------|--------|------------------------------|--|---------------------|
| Nov 24 | ✓ | ✓ | | | Nov 25 7 PM | Finance | |
| Nov 25 | ✓ | | ✓ | | Dec 10 | Trying to arrange funds | |
| Dec 10 | ✓ | | | | | | |

Develop prospects into car owners through Comfort's follow-up system

Form 74 gives a complete history of the methods used in getting the prospect and making the sale. Reverse side a Service Record to record repairs after car is sold and delivered.

If your salesman should leave your employ anyone could pick up these cards and follow up prospects intelligently.

The prices on either form F. O. B. Your City

100 cards \$1.25
250 " 2.50

500 cards \$4.50
1000 " 8.00

2500 cards \$16.00
5000 " 25.00

Form 72 tells all you need know about a prospect—his hobbies, best time to see him, addresses, phone numbers, type of car he is interested in, type and value of car he now owns, dates of interviews and results, financial status, etc. This form is printed on one side only.

No one can memorize personal facts necessary in following up prospects. Notations on odd pieces of paper and old envelopes do not serve the purpose.

Form 72

NAME Walter Herno SALESMAN Heber

RESIDENCE 1452 Shuman Pl. PHONE Cal 652 DATE 1/11

BUSINESS 107 N. Eighth St. PHONE Q. 6995 INTERESTED IN Trucks

CAR OWNED Ford MODEL 1916 PRESENT VALUE 2250.00

HOBBIES Base Ball BEST TIME & PLACE TO SEE Office a.m.

| CALLS | DATE | INTERESTED | ASKED FOR DEMONSTRATION | CHANGE TO CLOSE | DATE TO CALL | REMARKS |
|-------|------|------------|-------------------------|-----------------|--------------|--------------------|
| 1 | 1/16 | Yes | No | good | 1/21 | |
| 1 | 1/21 | Yes | Yes | | 1/23 | |
| 1 | 1/23 | | Yes | good | 1/27 | Expecting money in |
| 1 | 1/27 | | | | 2/1 | for day |
| | | | | | | Will close |

DATES LITERATURE SENT 1/11 . 1/15

DATE CAR SOLD 2/1

COMFORT PRINTING SPECIALTY CO., ST. LOUIS MO.
(ALL RIGHTS RESERVED)

COMFORT
Printing Specialty Co.
109 North Eighth St., St. Louis, Mo.

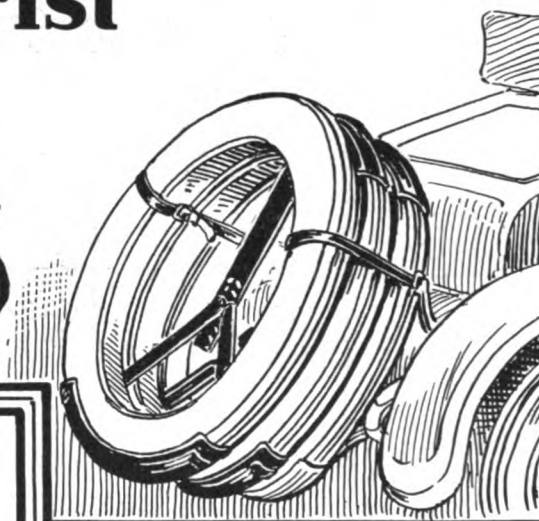
COMFORT PRINTING SPECIALTY CO.
109 No. Eighth St., St. Louis, Mo. 1922

Please send us _____ Comfort's Form No. 74 and _____ for which we enclose \$ _____, also send us Comfort's new catalog "Making and Saving Profits".

Name _____

Address _____ City _____

Every Motorist Carries a Spare Tire Wise Ones Carry **2-R-3**



Many car owners would be supplied with two or more spare tires if they had the means of carrying them.

Many cars are equipped to carry one spare but few to carry more than that.

The 2-R-3 Tire Carrier is just what thousands of motorists have been looking for.

It is strong, yet light.

Adjustable to any tire, yet simple in construction.

Each spare is attached to the one before, except the first, which is supported by the carrier attached to the car.

Just hang the 2-R-3 Tire Carrier on the attached tire, then set the additional spare in the supporting seat of the 2-R-3, then strap both tires together.

That's all.

No bolting, no tools, no fuss.

The discriminating car owner needs only to see the 2-R-3 Carrier to want it. Then his satisfaction leads him to tell his friends.

Each 2-R-3 Carrier is a constant salesman. It sends business to the dealer and gives satisfaction to additional users.

We also manufacture tire carriers for side and rear of all Ford cars, and will be glad to supply descriptive literature on request.



Model S

Illustration shows two carriers at top and bottom of tire.

Prices:

| | |
|--------------|--------|
| 3½ in. . . . | \$2.50 |
| 4 in. . . . | 3.00 |
| 4½ in. . . . | 3.50 |
| 5 in. . . . | 4.00 |

Model Y

Prices:

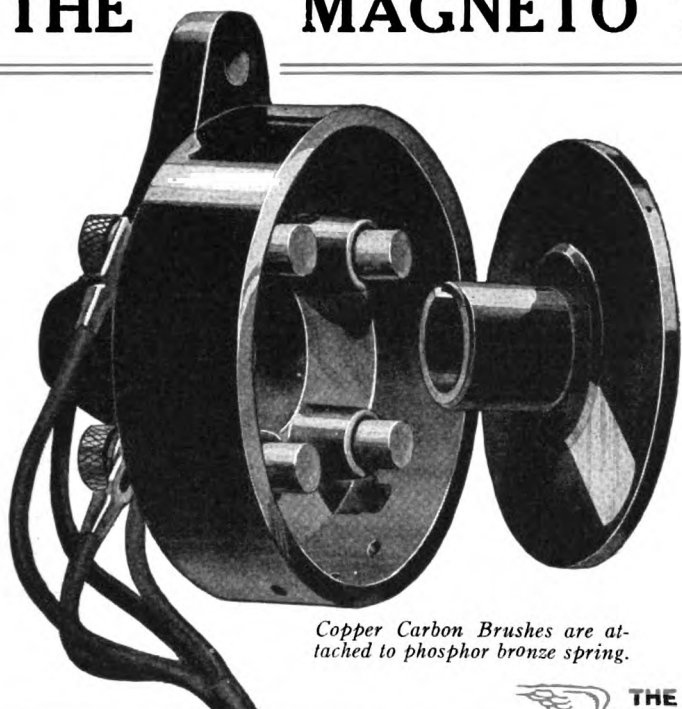
| | |
|--------------|--------|
| 3½ in. . . . | \$4.50 |
| 4 in. . . . | 5.00 |
| 4½ in. . . . | 5.50 |
| 5 in. . . . | 6.00 |
| 5½ in. . . . | 7.00 |



INTERNATIONAL STAMPING COMPANY

400 North Leavitt Street, CHICAGO, U. S. A.

THE MAGNETO TIMER FOR FORDS



Copper Carbon Brushes are attached to phosphor bronze spring.

4 Live Reasons

Why Spad Timers Are The Best

1. **Absolute freedom from oil assures a hotter spark.** The brushes are extended away from any possible contact with oil.
2. **Not affected by a wobbly cam-shaft.** The rotor is a flat disc having no moving parts such as the customary brush and roller. This assures freedom from wear caused by a wobbly cam-shaft.
3. **Unique construction assures long life.** The average life of the brushes and rotor—the only wearing parts—is over one year. The shell, the most expensive unit, lasts forever. Brushes are easily replaced.
4. **Similar in construction to Magneto Distributor.** Both units being made of high grade insulating material makes short circuiting impossible. Ideal contact is made between phosphor bronze segment in rotor and copper carbon brushes in shell.

Unusually attractive dealers and distributors discounts.

SPAD MANUFACTURING CO.
INC.
42-B West 39th Street NEW YORK

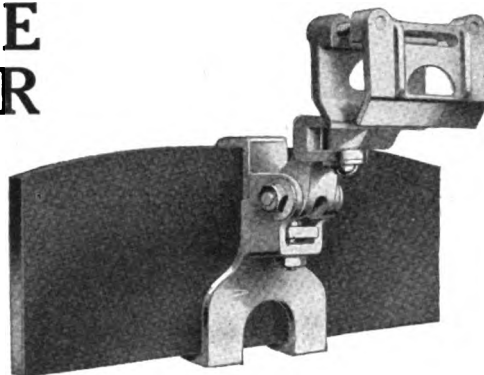


LIST PRICE IN U. S. A., **\$2.50**
formerly \$4.00. West of Rockies,
\$2.75. Canada, \$3.75.

REPEAT ORDERS PUT THE CHIEF AUTO MIRROR OVER

Every dealer, jobber and car distributor who is selling this Quality Mirror has come back for more—so will you.

The Chief Auto Mirror stays sold on its merits. Carefully constructed and finished like a piece of jewelry, it sells on appearance as well as utility. The mirror is the finest quality French crystal with the silvering protected against the elements by a patented chemical process.



Model A—Style No. 1—Oval, 8 x 2 3/4"

Made especially to fit the center windshield frame of all touring and open cars. Faces the driver for rear or side views. Reversible with windshield open or closed or top up or down. The lock-clamp will fit any universal windshield frame, oval, round or square, and holds securely.

Price, \$5.00

Chief Mirror brackets can be easily adjusted to any angle and stay put. Every bracket is interchangeable.

JOBBERs and DEALERs are enthusiastic over the sales possibilities of this wonderfully attractive line of mirrors. If you haven't received a copy of our catalogue write for it now. We will supply direct all dealers whose jobbers do not carry the line.



This trade mark protects the dealer against substitution and guarantees the Chief to the owner.

BRITTON AUTO PRODUCTS CO., Inc.

118 West 63rd St.

New York City

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, *Editor*

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| Repairing the Automobile Top | 22 | Up-to-the-Minute Garage Equipment | 54-56 |
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AMERICAN GARAGE & AUTO DEALER, Inc.

116 South Michigan Avenue, CHICAGO

J. R. HASTIE, president and treasurer.
H. D. FARGO, vice-president.

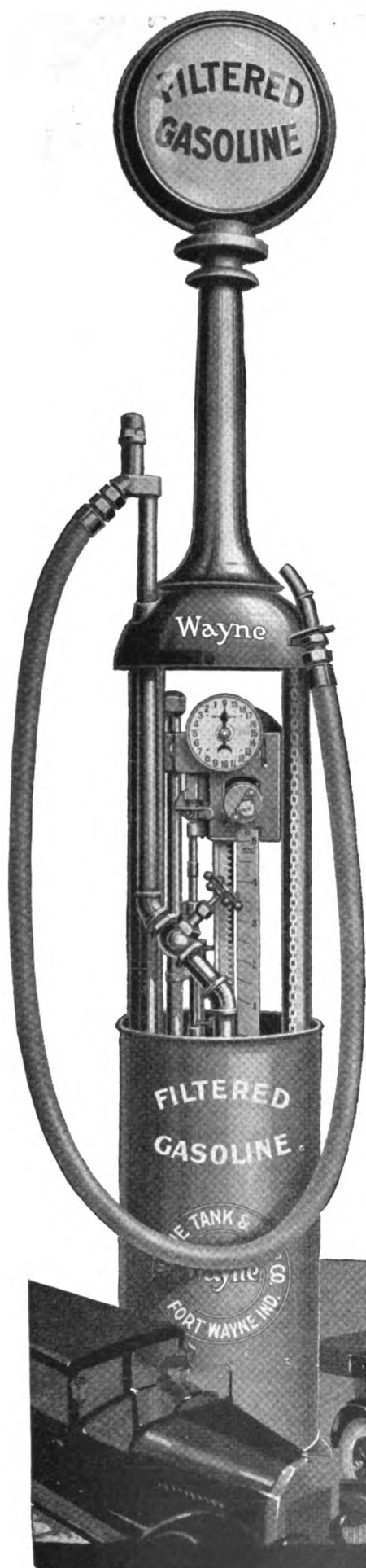
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R. S. CLISSOLD, vice-president.

S. R. EDWARDS, secretary.

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WALTER C. ORR, Manager, Cleveland Office, 422 Prospect Bldg., Cleveland, Ohio
A. H. GREENER, Manager, New York Office, 116 W. 39th St., New York, N. Y.
BOONE RILEY, Manager, Pacific Coast Office, 911 Haas Bldg., Los Angeles, Cal.
H. D. FARGO, JR., Manager, Chicago Office, 116 S. Michigan Ave., Chicago, Ill.

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Postoffice Entry—Entered as Second Class Matter March 1, 1916, at the Post Office at Chicago, Illinois, under the Act of March 1, 1879.



Everywhere — And why

Everywhere, Wayne Honest Measure Curb Gasoline Pumps are serving motorists and bringing them back again and again to retail gasoline stations for more gas.

Why? The answer may be found in one word: *satisfaction*.

Wayne Pumps satisfy the man who buys gasoline. They serve him more quickly than the ordinary pump. They put into the tank of his car every drop he pays for—no more, no less.

And, by dispensing only clean, filtered gasoline, they prevent the host of carburetor troubles caused by dirt, dust, and water.

Many motorists know this. And many more are learning it from our national advertising and from their own satisfactory experiences with Wayne Pumps.

Why not join the rapidly growing list of retailers who operate Wayne Pumps and share in the business which they are getting from satisfied motorists everywhere? Write for more facts about Wayne Honest Measure Pumps. Ask for Bulletin 276-AGD.

Wayne Tank & Pump Company,
774 Canal Street, FORT WAYNE, IND.

San Francisco Office: 631-633 Howard Street.

Canadian Tank & Pump Co. Ltd., Toronto, Ont.

An International Organization With Sales Offices Everywhere

Wayne
REG. U. S. TRADE MARK

HONEST MEASURE PUMPS

SIoux REAMER

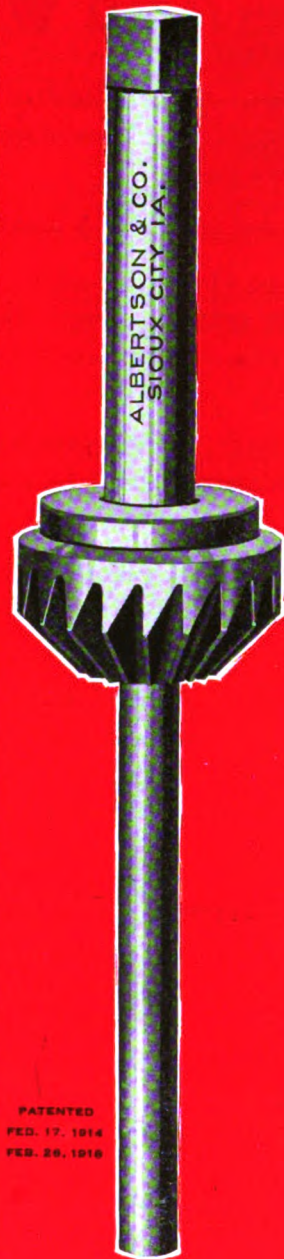
SAVE hours of tiresome valve grinding by removing the carbon pits and other irregularities from valve seats with this rapid cutting and absolutely accurate Sioux Reamer.

The Sioux Reamer Pilot extends through the valve stem guide and keeps reamer perfectly centered, thus insuring accurate cutting.

SIoux SERVICE

keeps reamers sharp at no cost to you but carrying charges. When reamers get dull send them pre-paid and direct to us, including return postage, and they will be sharpened and returned to you the same day received. We maintain a special department for this service. Be sure you get Sioux Reamers if you want Sioux Service. Keep an extra set of Sioux Reamers on hand for use while the other set is being resharpened—

We Make Reamers to Fit Every Engine Made.



PATENTED
FEB. 17, 1914
FEB. 26, 1916



**Your Jobber
Sells Them**

ALBERTSON & CO.
SIOUX CITY, IOWA

American Garage & Auto Dealer

*A Business Paper Exclusively for the "Small-Town"
Automotive Trade*

Vol. XIII. No. 3.

CHICAGO

MARCH, 1922

Selling "Service and Just One Car"

How Two Iowa Garagemen, Starting in a Woodshed in 1903, Followed This Idea and in 1921 Sold 50 Per Cent of the Cars Priced Over a Thousand Dollars in Their County—"Showroom is 90 Per Cent of Selling Cars" They Find

By F. L. Clark

In 1903 two brothers, Albert and Ole Allen, opened a garage in a woodshed at Elkader, Clayton county, Iowa, a town of less than 2,000 inhabitants. Now, in the same town, they have a garage which would be a credit to communities many times the size of Elkader. They have the Clayton county agency for one of the popular medium-priced cars, with five sub-agencies, and carry a stock of parts so large and complete that they ship throughout northeastern Iowa and into Minnesota and Wisconsin.

Of cars sold in Clayton county in 1921, over 50 per cent of those priced over a thousand dollars were sold by the Allens. The population of Clayton county is 25,032 with no town over 2,000 within it, yet in the distribution of their particular car in Iowa only two counties—Woodbury,

Sioux City's county, and Polk, the county holding Des Moines—exceed Clayton, and in both cases by only a small number.

Woodbury, with a population of 92,171, has 801 cars of the make which the Allens are selling. Polk, with a population of 154,029, has 736. Clayton with a population of only 25,032 as stated, has 723 of the same kind, or one to about every 30 persons in the county. The Allens sold them.

It would seem that either Clayton county folks are "bugs" about the make of car which the Allens sell or that the Allens are "some salesmen." Both things are true but, with all due respect to the excellent car that the Allens handle, much of the credit for the fervor of Clayton county for it is due the Allens. They make them buy them for they know how to sell—but

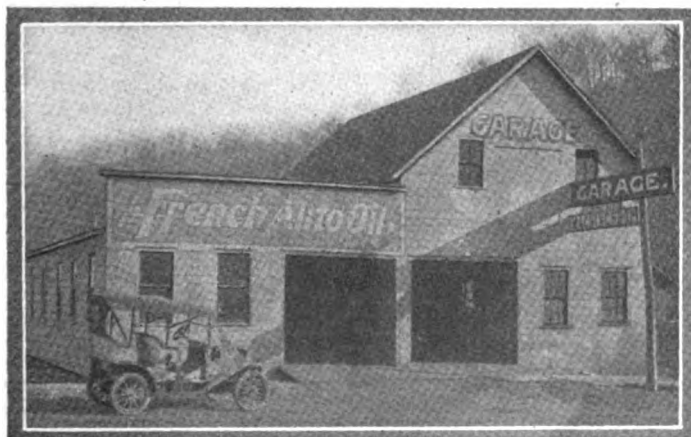
that's just the beginning. Their real forte is their follow-up.

"How do you get the business you do?" one of the Allens was asked.

Without a moment's hesitation he clipped off the answer: "Service and just one car."

Nothing very new about that, perhaps you are thinking. Every garageman knows the value of service and specializing. The Allens have put the knowledge into practice and have shown their world that service pays. Furthermore, they have shown that it is possible to devote entire attention in a small town to a car priced well above a thousand dollars and do a big lucrative business.

"The Ford garage here gets the Fords," said Mr. Allen. "The garage across the street gets most of the other



Contrast Woodshed In Which Allen Bros. Began Business in 1903 With Modern "Spick-and-Span" Appearance of Present Establishment.

makes of cars. We get the —s. Our men work nearly all their time on just the one make of car. Of course, with such constant application, they get to know it thoroughly, so we are able to give the people who buy cars of us better service than if we worked on a lot of different makes. They are better satisfied, get better service out of their cars—and that sells them and their friends more cars."

A conversation with any one of the owners of the 723 cars bought from the Allens shows how the "just one car" method works out in a small town and rural community where folks pass the word along about their cars because they know each other in a way city folks don't. The reputation the Allens have won by the care they give the kind of cars they handle has made that car the popular buy of the countryside.

The more of the cars that are bought, the more the Allens can stick exclusively to work in the shop on the one make, and the more expert their mechanics become. Better repair service keeps boosting the popularity of the car and sales all the time. It works in a cycle—how well is indicated by the fact that the Allens had 15 on their force last summer.

Another thing about "just one car," as demonstrated in their management, is carrying a big stock of parts.

"If a — car should get smashed up in the ditch over there," one of the Allens said, "no matter what parts or how many are broken, we have them, and so can make repairs without delay. People know this and it helps sell our car for people like to feel that if anything happens to their car there is a place where they can go and get it fixed right away, without waiting for parts to be sent for."

Says one of the Allen's customers: "When you take your car to them, they tell you what is the matter with it, and it's the truth, for they know what they are talking about. When they fix it, it stays fixed."

That's another sidelight on the Allen exposition of service. It shows the value of a 50-50 mixture of squareness and efficiency.

Then there are the little courtesies which cost nothing but pay splendidly. You receive them at the Allen garage. For instance, a motor picnic party was caught in a thunderstorm near Elkader. Through torrents of rain

they made their way to the Allen garage. The doors were thrown open on the instant and three or four people helped them in. The storm lasted for quite a while, long enough so that going to the picnic place was out of the question. "Let's eat our supper here?" somebody suggested.

"Any objections?" one of the floor-men was asked.

"No, indeed," was the answer. He disappeared and in a minute was back

Importance of Having A Definite Aim.

Men continually fail for lack of a definite aim. The man who is perpetually hesitating which of two things he will do first will do neither. The man who resolves, but suffers his resolution to be changed by the first counter-suggestion of a friend—who fluctuates from plan to plan and veers like a weather-cock to every breath of caprice that blows—can never accomplish anything real or useful. It is only the man who first consults wisely, then resolves firmly, and then executes his purpose with inflexible perseverance, undismayed by those petty difficulties that daunt a weaker spirit, that can advance to eminence in any line.—William Wirt.

carrying a table. He set this up in the front of the showroom, turned on the lights, brought some chairs and generally made the party feel they were "cordially welcome."

It was a little thing, but it's the little things that count.

In so many small-town garages, the gasoline tank seems to be nobody's particular business and you get prompt service or don't get it just as it happens.

At the Allens there are always four people delegated to keep an eye on arrivals asking for gasoline. Each office desk has an electric bell connected with the back room, and pressing a button brings a floor man immediately.

Neatness and cleanliness is a hobby with the Allens. No chance to get grease and dirt on your good clothes while waiting in their garage.

Another thing they concentrate on is showing cars to advantage. "The showroom is 90 per cent of selling," as they look at it. They have never been satisfied with their showroom—despite its selling power—and this Spring are making it over from top to bottom, front to back. When it is done, it is

going to be what they want—something they spent a long time figuring out.

The entire front of the building, for a depth of 40 feet, under the new plan, will be devoted to offices, sales-room, and stockroom for parts and accessories. The large driveway is being removed from the front to the side of the garage and the whole front with the exception of a door into the office is to be display windows.

Ornamental steel ceilings, a Terrazo polished marble floor, decorated walls, indirect lighting are to give the kind of setting the Allens want to display their cars. Between the showroom and the garage where cars drive in will be glass partitions, so that the lure of the cars on display will catch visitors while they are waiting for repairs. An open door will invite them in to look around.

The parts and accessories departments are to be located on one side of the room with showcases in front and counters in the rear. Steel bin equipment will house the parts. The main office is to be on the east side of the showroom with a counter across the front. The private office will be just back of this.

It's going to be the finest showroom in this part of Iowa outside of the cities. That raises a point:

If the Allens have sold a car to every 30 persons in their county with the old showroom, and "showroom is 90 per cent of selling cars," how many will they sell with the new showroom?

Perhaps the information that they have plans drawn to extend their building back until it will be nearly a block long and have over 20,000 square feet of floor space, is the answer to the question.

Installation of New Taxi Service in Naples is Announced.

Hitherto taxicabs have not operated in the city of Naples, their place being taken by small horse-drawn cabs equipped with taximeters and a few taxi motorcycles with side cars.

On December 1 a new service was started with 20 motor taxicabs, to be increased to 100 in the near future. The new cars are made by the Didato Co., of Turin, and are said to cost 20,000 lire each. The rates are two lire for the first 500 meters and two lire per kilometer thereafter, with a flat supplement of 50 centesimi.

Snappy Advertising Gets the Business

And Deals "Knock Out" Blows to Competition for This Florida Service Station—Original and "Out of Ordinary" Advertisements Attract Motorists and Unrivalled Service Brings Them Back Again—All-Night Service Profitable

By Ruel McDaniel

Down in a small city in West Florida, competition between two big oil companies has brought about the establishment of more filling stations and general service stations in the place than the trade demands. In fact, some of the stations are operating at a loss.

Besides the establishments of the two larger concerns, there are three or four independent service stations which depend upon the open market for the purchase of their products, and rely on their service and friendship to carry them through.

In the midst of all this competitive selling a new service station sprang into being. H. N. Girdlestone announced the opening of "Motor Inn" in the latter part of September of last year.

Needless to say, his friends pitied him for taking such a chance with his limited capital. His stronger competitors openly laughed at him. Girdlestone said nothing, but did a lot.

He did not go into the thing blindly. He fully realized that, in order to succeed in the business which he was entering, he must not only equal the service and quality of the products of his competitors, but he must do even better. So long as he offered nothing more attractive than the automobile owners were accustomed to receiving, there was no inducement for them to change to his service.

Whether or not the products of the average service station vary greatly in quality is a matter of opinion but, at any rate, the general public in that part of Florida pays but little thought to quality in gasoline. So long as it keeps the old motor turning over they are satisfied. Taking this view of

the situation, Girdlestone realized that to bring automobilists to his place he must give them service—service unequalled anywhere in the city. And he must let people know that he was actually giving this service.

When a customer once comes to Motor Inn he usually keeps coming. The main hitch is to bring him there the first time. This is quite a proposition, since the service station is located in what might be termed an "out of the way" part of the city, so far as motor car traffic is concerned.

Newspaper advertising is used extensively for this purpose. Great care is exercised in arranging the matter for the space allotted. Although the reading matter could not be called startling, it is, to say the least, out of the ordinary, and for this reason the advertising of Motor Inn draws much favorable comment.

A recent advertisement referred to the loss of a gasoline bucket. The fact was that they had lost no bucket at all, but they had dozens of inquiries about it, and suggestions as to a possible clue to it came in in large numbers.

At the first rapid reading the advertisement appears somewhat senseless, and for that reason it is read the second time. By the time the second reading is made, "Motor Inn" is so firmly fixed in the reader's mind that

it is difficult to forget, and the first thing he knows he is around there having the old tank filled up!

Of course, the underlying feature of all the advertising is the establishment's service, but some of the advertisements put special stress on that asset. For instance, one read as shown in another of the illustrations on the next page.

In this advertisement the station's greatest asset—service—is displayed conspicuously, and the telephone number is featured. The latter is done in order to be of assistance to customers who, for one reason or another, are not able to come to the station to have their gasoline tanks filled. This is especially convenient to one who unexpectedly runs out of gasoline when out of reach of a filling station.

A truck is especially equipped to render assistance to motorists in distress and, regardless of how far from the city the call comes, or the amount of gasoline purchased, no charges save the actual price of the products bought are ever made. The truck gives tire service also, and in this way an enviable tire business is being built up.

About the first of this year, Girdlestone decided that a regular night service would be of assistance to motorists, and would consequently mean more money for him. Accordingly, the establishment now remains open all night.

In announcing the all-night service, the advertisement shown in the third illustration appeared in the morning newspaper. The headlines mildly startled the readers of the paper and, consequently, in investigating as to who was the unfortunate loser,



"Motor Inn," a Florida Service Station, Defies Competition by Its Exceptional Service and Good Advertising.

and what it was he lost, they saw that Motor Inn was now rendering all-night service to motorists. They also read that the filling station was putting special stress on its service.

It might be stated here that the night service is a paying proposition, even though it is being operated in a city of only 30,000 people. Girdlestone explained that the business he did in January paid for the additional expense of keeping the place open all night, at least, and he has the added

some sloppy, rainy night, you can bet your life that not one of that party will fail to remember Motor Inn the next time he wants gasoline and oils.

January is conceded to be the most unfavorable month of the year for the filling station business—especially so in that partic-

of competition and brings in the business.

During the month of October, last year, Motor Inn made sales amount-

We Have Lost Our Bucket!

WILL THE GENTLEMAN WHO
BORROWED OUR 5 GALLON
GASOLINE BUCKET
PLEASE

Motor Inn

Corner Alcaniz and Wright Streets.
Any Time of Day or Night

This Unique Advertisement Brought Many Inquiries.

publicity, which is steadily increasing his list of regular customers.

For instance, if he rescues a stranded party of "joy riders," about five miles from the city, at midnight on

Service!

DO YOU KNOW THE REAL MEANING OF THE WORD
SERVICE?
IF NOT

Motor Inn

On the Corner of Alcaniz and Wright
Any Time, Day or Night

OR RING

1196

Another of These Original Advertisements
Puts Special Stress on Service.

ular section of the country—but, with the addition of all-night service, that month showed a noticeable increase in receipts over the month before.

A glance at the monthly receipts of the concern is convincing evidence that service and snappy advertising deal "knock-out blows" to the "mailed fist"

WE HAVE LOST OUR KEYS

Motor Inn on the corner of Alcaniz and Wright
Any Time of Day or Night

SINCLAIR OILS AND TARGO GASOLINE
Will Help to Keep Your Motor Nice and Clean

"SERVICE" OUR MOTTO—OPEN DAY AND NIGHT

Motor Inn

Corner Alcaniz and Wright Streets

The Third Reminds of All-Night Service.

ing to \$2,321; in November, \$3,178; December, \$3,493, and January, this year, \$3,505; thus showing a gradual increase during a season which ordinarily brings a declining trade.

The monthly business quoted does not appear out of the ordinary at first glance but, when the competition which Motor Inn has to overcome is taken into consideration, and the fact that the daily overhead expenses average only \$7.83, it takes on a different light.

Insurance Garagemen Should Carry

Nearly Every Business Hazard of Today Can Be Insured—There Are Many Forms of Insurance Which Are Applicable to the Garage Business and with Which Garagemen Will Find It Worth While to Acquaint Themselves

By Clarence T. Hubbard

When a garageman strives with all energy, salesmanship, and opportunity to increase his profit and, then, through the means of some business interruption—such as a fire or burglary—loses this financial gain, he can be said to be "gaining at the bung hole but losing at the spigot."

The garageman, anxious to legitimately make all the money possible that his business will permit, should give attention not only to increasing sales but also to the guarding of all hazards whereby profits may be diminished.

Just how much insurance a garageman should carry is, of course, a matter of calculation as to how much his income will warrant. Strictly speak-

ing, the garageman should carry as much insurance as is consistently possible. For, in addition to the protection so acquired and the attendant service secured, there is a "credit value" to be considered.

You will find that the insurance you carry has a bearing on the considerations given you by your banker and also by the houses from whom you expect credit. Every garageman should consider fire insurance, general liability insurance, burglary insurance and plate glass protection.

General liability insurance includes public liability protection. Under a policy of this kind, the garageman guards himself against the loss of profits and resources, which might

have to be paid a customer through an accident to the customer in slipping, falling, or getting injured in any way while in the premises of the garage. Inasmuch as law suits are today started at the slightest provocation, the reasoning for having such protection is very apparent.

Fire insurance on the stock and equipment carried is, of course, equally as essential, provided you carry a stock which is inventoried at an investment which would represent a sum too uncomfortable to replace from surplus funds. As most garagemen own their own buildings, the hazard of fire is ever present and the value of this type of insurance can be readily seen.

The garageman should also carry

burglary insurance, for the average dealer finds it necessary to keep a certain amount of money in the office safe. With robberies and store thefts constantly on the increase, the worthwhileness of protection in this direction can easily be realized.

The form of burglary insurance most popular with garagemen is a safe and mercantile policy, which protects not only the contents of the safe but all damage to the safe itself and to the premises, which a thief might cause in his methods. Such a policy can also be written to cover not only all loss of money but also loss of uncanceled postage stamps and such merchandise as might be in the safe.

The premiums for burglary insurance are not expensive, although the minimum premium for which such a policy will be written is \$5.50. However, for a very few pennies a day, you can secure burglary insurance protection that will guarantee no loss of profits or income in this direction.

As nearly every garageman and automobile dealer has a large plate glass or two, which is constantly exposed to the danger of storms, flying missiles, falling signs, crowds, explosions, and building settlements, as well as the contraction of surrounding material caused by cold weather and the expansion brought about by hot weather, the value of carrying protection against financial loss which might be caused by window breakage can easily be reasoned.

Especially is this the case at the present time, when the plate glass is so high in price and difficult to obtain. Insurance companies writing the form of insurance agree to indemnify a merchant at the market price of the plate glass.

A clause in this form of insurance, which is worth while for the garageman to remember, is in the provision which all policies now contain to the effect that all plates of 100 feet square, in the event of breakage, are to be replaced in two panes, for which a discount of 25 per cent on the premium is allowed.

In addition, there are other coverages which can be well recommended for the garageman whose income will permit carrying them. Among these are found fidelity bonds, which you can have an insurance company write to protect you against theft on the part of any employees or salesmen.

By having your salesman bonded for

a certain sum, you can further guard against the loss of any money in the knowledge that the insurance company will reimburse you for all funds up to the amount insured which the salesmen might misappropriate.

The garageman himself should, of course, carry life insurance; also personal accident insurance. The value of personal accident insurance to the proprietor is demonstrated in the loss of income which might result should you be temporarily laid up by means of some mishap or sickness. Especially is this true of the proprietor who is recognized as a salesman as well.

Still another form of insurance, which some dealers adopt either temporarily or permanently, is in the new coverage being written by insurance companies under the title of "Civil Commotion and Riot" insurance. This form of financial protection returns to the merchant all financial loss which he might suffer by means of a riot, the outcome of a strike or some similar uprising.

There is still another form of insurance which is now being written, and to which at the present time attention can be drawn merely as a matter of information. It is in the form of credit insurance which protects a dealer against all loss because of granting credit. You can, if interested, obtain full information regarding this form of insurance by writing to any broker or agent.

Nearly every business hazard can today be insured. Your own employees can be insured against loss by sickness or accident under the group plan, which also protects against loss of life. Inland and ocean marine forms of insurance to guard against the loss of

MAKE OPPORTUNITIES.

If you want to succeed in the work, you must make your own opportunities as you go on. The man who waits for some seventh wave to toss him on dry land will find that the seventh wave is a long time coming. You can commit no greater folly than to sit by the roadside until some one comes along and invites you to ride with him to wealth and influence.—John B. Gough.

goods in transit—either by rail, truck or water—are popular.

Check forgery insurance is written by several insurance companies in the United States. This policy is accepted by many business men, as the premiums are reasonable and the protec-

tion most valuable. Sprinkler leakage and water damage insurance to protect your stock from loss by damage from water is another form of desirable insurance protection that can be obtained.

Automobile insurance is, of course, most essential on any cars owned by the dealer. As automobile dealers and garage owners are constantly called upon in this direction, it is of business value to be kept fully posted as to what is transpiring in the automobile insurance field.

Automobile insurance companies are having bad experience due to heavy losses, brought about, no doubt, by the somewhat mutable business conditions. This has resulted in an increase in many of the rates and some forms of insurance have been restricted.

Collision insurance, for example, has proved to be very bad experience, and most of the larger insurance companies are now writing only the \$100 deductible and \$50 deductible forms. By this form of insurance, it is meant that the policyholder assumes the first \$50 or \$100 of expense in connection with the damage, the insurance company being responsible for all over that amount.

One or two insurance companies have even restricted themselves to writing only \$100 deductible insurance. This form is, of course, considerably cheaper than full coverage insurance and they reason that, with the policyholder a co-insurer and responsible for the first \$100 of damage, he will become a more careful driver.

Theft insurance has also been somewhat disastrous, although the concerted efforts of all insurance companies has helped to remedy this situation. Liability insurance is being more and more recognized, and should be recommended to the automobile owner as a most important type of automobile insurance. Following, in order of importance, is fire and theft insurance, property damage insurance, and then collision insurance.

The garageman should look upon insurance, not as a gamble but as a business proposition, the cost of which should rightfully be included in his expense of doing business. Insurance should not be looked upon as something to merely have handy in case of an accident or unexpected business happening, but rather as a protection service to be applied in minimizing the hazards of losing income, resources and profit.

Bizness Sekrits Privit Confidenshal

Persy Got Lit On Like A Brik Chimbly Falling on Him Today Becaws He Went and Blabbed About Our Map Skeem—Weed Awt to Keep Q T About How We Run Our Bizness and What We Do to Get More Munny and Make Better Proffits

By Frank Farrington

Deer Pete:

When you going to put old Pinkvill on the mapp, Pete? A feller cum along the other day selling mapps and he wanted to sell me one because he sed they was edjucashonal and wood sho you where ennything was, and I sed I want to see it becaws I want to kno where Pinkvill is where I used to live before I came to Pike city.

So the feller unroled his mapp and shode me Pike city and a lot of other places, but I sed I got to have Pinkvill on it or I cant buy no mapp. Of coarse I diddent want to buy enny mapp ennyway but I just sed that. Well he got mad and sed I invented Pinkvill and there wassent no place by enny such name as that. He sed his mapp wassent enny pink mapp and I sed no it was a punk mapp and he went off mad.

Don't forget, Pete that ennything Ive told you in a letter about our bizness is privit confidenshal. I dont kno as I ever told you enny grate seekrits but I cant remember all Ive sed and today the boss lit on Persy like a brik chimbly falling on him becaws he went and blabbd around about what we was going to do.

You see the boss was going to get out a advertisement that wood show a mapp with the rodes into Pike city from all around, and he was going to hav it made big and put it up on rodes and in garajes in other citys around so it wood sho toorers how to get to us.

Well Persy got wize about that skeem and he told sum feller about it and what a grate skeem it was and that feller told sum other feller and anuther garajeman herd it and he beet

us to it and got out a mapp first. It aint a very good one and the boss is going to get ours out too, but heez sore and he found out who leekt about that seekrit and what he told Persy was a plenty Ile say.

"Persy," he says—I was lissening in becaws I was rite by the offis dore—he says "Persy did it ever okur to you that the inside dope about our

then ennybody wood know how much they think you make only you dont make it. Bob says if the fellers in Kongriss make enny such law as that, they awt to haf to go in bizness for a wile and see how it works becaws he says hardly enny of those fellers is bizness men but mostly pollytishons. I gess it woodent be a bad idea to hav a law for pollytishons to tell how much munny they make, hey Pete?

Ile bet if the Kongriss fellers try to pass enny laws the boss dont like theyll heer from him. He aint one of theez guys that thinks it aint enny of his bizness who makes the laws or what kind they make. He knoze who is his Kongriss feller and who is in all the offises up to Washington and whooz guvvyner and all those things, and he says if a feller goes to sleep and dont let those fellers kno whats w h a t

theyll all the time be putting sumthing over that he dont like.

So he reads in the automobile papers all about laws thats going to be or aint and he rites letters and when heez bin dicktailing one of those letters in privit Sally asks me sumtimes if I diddent heer it sizzling when she rote it down. She says sumtimes theyre so hot they skorch the tiperiter paper where the keez hit it. Of coarse Sally's kidding me but I gess the boss can tell it to em all rite.

Sally is a grate hand at kidding. Im sum kiddier myself so we get on fine. One thing about Sally, sheez always good nachurd. Say I hate theez fokes that cum down to bizness with a grouch and take about haf a day to get kind of cheerd up. Spoze it is kind of rainy when you wanted the sun to shine. Aint rain a good thing?



Sumtimes When the Boss Has Bin Dicktailing One of Those Letters Sally Asks Me if I Didn't Heer It Sizzling When She Rote It Down.

bizness is good stuf not to tell ennybody about? Heers this feller, Johnson, heez beet us to it on our mapp skeem just becaws you coodent keep your mouth shut about it," and then he went on and told Persy sum things about keeping his mouth shut and I notist when Persy cum out his mouth was shut all rite and he wassent telling enny seekrits.

I gess I never thawt much about that and mebbly Ive told sum things I haddent awt to of told but, bleev me, never agen. Ime dum. Bob says the boss is rite, that weed awt to keep Q T about how we run our bizness and what we do to get more munny and make better proffits and all that.

He says the fellers in Kongriss wood like to hav a law that youd haf to put on everything how much you paid for it and how much you charj for it, and

They used to be a feller in Pinkvill Pete that you remember, old Jasper Jimson, and he was generally pretty souzd and so he was good nachurd and when it rained heed say, "Rains a good thing. Rain makes corn grow and corn makes whisky." I gess old Jasper woodnt be so chipper now wood he Pete, but I spoze heez ded yet.

I notist one thing and that is that if sum of the fellers is pretty sore and

grouchy in the morning and one feller cums in with a smile and jokes a lit-tel the rest get limberd up pretty soon. Its so out in the shop. If Chick and Polo are cross, then Bob mebbly has to go out there and he kids em a lit-tel and they cum back at him and after theyve joked sum theyre all rite.

I gess it pays to have a good nachurd garaje becaws Ive notist that when sumbody cums along and drives in and

wants sumthing, if youre good nachurd with em they feel more like getting sum work dun.

I dont buleev even Sally wood make enny grate hit with me if she was one of theez sollum dames that looks as if theyd just et a pickel, but if she was that way she woodent be Sally so I aint worrying enny about that.

Rite soon old dope hound.

Yours til we meat agen Bill.

The Law, The Facts and The Garage

In Which Another Angle of the Law As Affecting Sales to Minors Is Presented—Account Guaranteed So It Will Stick by Getting Guarantor's Promise in Writing—Promise and Signature May Be Placed on Charge Slip

By A. F. McCarty

The Brown Garage & Auto Supply Co.'s establishment was wearing gala dress. Although it was between the seasons of spring and fall, and the first rush was over, the management never permitted the place to gather the stale look of the "day after," and believed that when a rush had receded to its ebb was just the time for putting on extra "airs." As a consequence, the stock was spick and span and the windows ablaze with the handsomest things the trade had to offer.

As Elwood Brown, the head and genius of it all, passed about the sales-room, his satisfied glance roved from side to side and, as he perceived Nelson, his head salesman, he stopped with a word of commendation.

"Pretty nifty, Nelson," he said with a wave of the hand which included the whole place.

"Glad you like it, Mr. Brown," said Nelson. "By the way," he added, "do you remember that Boys—young machinist at the shops, you know—the fellow for whom we ordered some special goods and then got mixed up on canceling the order?"

"I should say I do remember him," replied Brown.

"Well, he was just in here and bought another bill of goods. Wanted me to trust him for them. At first I thought it would be all right as he had paid promptly before, as you will recall, so I had it put up and gave it to him. Then I thought a little precaution would not be out of place, and asked him if there wasn't someone who would stand good for the account, explaining that it was because he was a minor. He didn't take offense, but

went out and brought in Henderson Otis, who said he would guarantee payment of the bill."

"That's good work, Nelson. You played safe and also kept your customer's good will. Good work!" and Brown finished his round of inspection and proceeded to his desk on the balcony.

For some weeks, the law and the facts were strangers to that garage. Then, one day the credit man called attention to the state of Claud Boys' account. Several statements had been sent that young man, but he had not been seen nor heard from. Mr. Brown recalled that the bill had been guaranteed by Henderson Otis and he instructed that communication with that gentleman be had at once.

Otis, however, took a queer and unexpected slant at the matter. He did not deny having guaranteed the account, but he did not feel like paying bills for Claud Boys and, in short, what was the store going to do about it?

Otis was well worth it and Brown determined to sue him. He telephoned to George Updyke, asking that lawyer to stop in on his way to lunch.

"I want you to bring suit against Henderson Otis, quick," he said to the lawyer.

"What over?" asked Updyke.

Brown gave him the facts as they have been related here, whereupon the lawyer shook his head.

"We wouldn't get past first base with that suit, Mr. Brown. It is barred by the statute of frauds which says, in practically every state of the Union, that 'no action shall be brought

whereby to charge a party on any special promise to answer for the debt of another unless the promise, or some memorandum thereof, be in writing and signed by the party to be charged or by his agent.' That promise by Otis, while binding morally, has no legal effect whatever because not in writing."

"That's a new one," said Brown. "Well, suppose I get his signature to something now, showing he did promise, would it still be good?"

"Fine, if you can get him to do it. All the law requires is something in writing, signed, which proves the promise was made."

"And, in the future, should we have a similar case, how would it do to write on the charge slip, 'Payment Guaranteed,' and have the third party sign it?"

"You couldn't do it in a better or simpler way," replied Updyke. "And, of course, that would be proper whether the customer was a minor or simply one with no credit."

Although Brown managed to get Otis' name to a letter about the deal, which proved his promise, it was never necessary to bring suit, for Claud Boys, the innocent cause of much needless worry, proved again that he was honest. It developed that he had talked with Nelson about his bill, excusing the delay, and promising to bring in the money on a certain day. On that day he came in and paid.

Nelson had forgotten to tell the credit man about the arrangement and the young machinist had for the third time been made the victim of unjust doubts and suspicions.



Liability for Injuries During Strikes

Is Employer Liable for Injuries Caused to Strikebreakers While on Their Way to and From His Premises?—If So, Can Employer Contract Away That Liability by Agreement?—Decisions Which Have Been Handed Down by Courts

By Chesla C. Sherlock

Employers who enter into special contracts with strikebreakers for the purpose of inducing them to come to work for them—even in the face of excessive peril at the hands of the striking workmen—generally do so with all seriousness of purpose. They do not expect violence to result disastrously, but they are confronted with the necessity of pacifying the fears of timid men, so they generally do not care just what sort of an inducement they hold out to the men, just so they can get them to work. That is the important thing just then.

When that unlooked-for violence has taken place and the workman has been injured or killed, then the importance of the transaction assumes a very different complexion. The thing they want to know then is whether or not they have to stand by their guns and pay the indemnity, or the amount they agreed to pay in case this very thing should happen.

In a New York case, a workman was employed under a special contract whereby the employer agreed to indemnify him or his family in case he were injured or killed by strikers while in the service of the employer. It seems that the strikers finally succeeded in getting the fellow alone one night and proceeded to assault him, with the result that he died from his injuries.

The workman's family then came to the employer and demanded the indemnity he had promised under his contract. He was not moved by moral considerations at all, being one of those who have to be compelled by legal means to keep his written covenants. He refused to pay the indemnity, with the result that the matter was carried to the courts.

The court of last resort first went back to the common law. It was discovered that there was nothing in the common law dealing with the subject matter of strikes or emergencies, as they were unknown when that law was in force. The court then said that, if the family of the workman had any ground to compel collection of the in-

demnity as evidenced by the written contract, it would have to arise in the statute law.

This simply meant, unless there was a special statute recognizing the validity of such an agreement or else some statute imposing an obligation upon employers, in such cases, that no right of action would lie against the employer for the injury or death of the workman so employed. The court then examined the New York statutes and found that there was no statute under which the employer could be compelled to pay the indemnity he had contracted to pay.

This, however, is not always the case in contracts of employment involving striking workmen and strikebreakers, for the controlling circumstances of the case are often such as to throw an entirely different complexion upon the matter.

The employer cannot practice deceit and fraud upon the man he employs in the capacity of a strikebreaker and hope to escape from the matter with clean hands, if something happens to cause injury or death to that workman.

In another case, an employer got hold of a stoker for his heating plant and hired him, without in any way acquainting him with the fact that a strike was in progress at his plant, or in any way leading the man to believe that there was anything unusual going on or that he was apt to be subjected to any additional peril. The fellow went to work and, in the course of a few days, was fired upon and severely injured.

The court held that, if the employer was in the possession of facts or knowledge which would tend to increase the normal risks of the employe's work, he was duty bound to acquaint the workman of such facts at the time the contract of employment was entered into. Failing in this, the court saw sufficient grounds for holding the employer liable for the injury received by the workman.

It may be argued that there is little likelihood of the workman having remained at work for long without as-

certaining the true state of affairs and learning that a strike was in progress at the plant, but this is no shield for the employer to hide behind. It does not in turn alter the facts or the legal situation in the least, even though the workman did subsequently learn that a strike was in progress. It did not, in the opinion of this court, alter the employer's liability in the least.

In another case, the employer failed to notify the workman that there was a strike in progress at his plant. He worked for a few days, when a committee of strikers waited upon him and informed him that they could not permit him to continue at work and warned him that unless he stopped there would be violence. The workman then went to his employer and stated the matter to him.

The employer promised to provide a guard for him if he would continue at his work. The workman went back to his task, but the employer failed to keep his word. The result was that, a few evenings later after the man had gone to his home, the strikers came in upon him and gave him so severe a beating that he died.

His dependents then brought suit against the employer, demanding damages for his death, alleging the fact that the employer had failed to provide guards for the protection of the life of the deceased and further that he had failed to tell the workman of the strike at the time he had hired him.

The court stated that there was nothing in the statute permitting one to bring an action for death due to the negligence or wrongful act of another.

As for the compensation acts, some points must be recalled before we can leave the matter. Ordinarily employers are not liable for injuries received by workmen while they are on their way to or from their work. This is for the reason that such injuries are not "accidents" within the meaning of the compensation acts. It has further been held that injuries received at the hands of strikebreakers are not "accidents" within the meaning of the acts, which largely relieves employers of any imputation of liability.

Current Comments and Observations

By The Editor

Plan and Execute.

"Make your plan and then work your plan" is a thought that has been emphasized many times in the columns of the AMERICAN GARAGE & AUTO DEALER.

Marshal Foch, in a recent interview, told his philosophy of action: "Every time you've a task before you," said the Marshal, "examine it carefully; take exact measure of what is expected of you; then make your plan and, in order to execute it properly, create for yourself a method. Never improvise."

"The fundamental qualities for the good execution of a plan are: First, intelligence, then discernment and judgment which enables one to recognize the best methods to attainment; then singleness of purpose; and lastly, what is most essential of all, will—stubborn will."

In plain words, Marshal Foch says, "Make your plan and then work your plan." Accomplishment is always based upon proper planning and execution.

"Hard Jobs."

Predictions that this year will be a year of keen competition in the automobile field mean that there will be "hard jobs" for many men.

"A hard job is not to be avoided," declared a friend who has been connected with many corporations in advisory capacities. "On the contrary, it is to be run after, cultivated and hunted for. The trouble is that 80 per cent of business executives and others are looking for something that is not hard."

"Got to be hard job lovers," is the phrasing one concern used in its specifications for men required for certain vacancies in its organization. Another firm, a motor car manufacturer by the

way, telegraphed several times to our friend asking, "have you someone who loves something hard?"

When one really considers it, and looks around, it is found that the man who is known to be after a hard job has little if any competition, for commonplace people drop out usually before the start is made.

Time and again it is said that "there is nothing worth while that is not

Getting Things Done.

The way to get things done, the way out of difficulties, is on the one hand to minimize the difficulty and on the other hand to magnify the self-reliance and resourcefulness of the men actually in charge.—Samuel M. Vauclain, in System.

hard." Whenever it is predicted that a football or baseball game will be a hard close one, there you will always find the largest attendance, for people will not go to a game that they think is going to be an easy one—and they will not applaud things that are easy.

So, sort over your traits and encourage the best, for they are the ones which will help you to attempt and accomplish the hard jobs. Men of accomplishment are those who have done the hard jobs.

Be a "hard job" lover and you will have no competition.

Play for the Old-Time Market!

"The old-time market is coming back. The new-time market is going." Thus declared a man who has made an extensive study of markets from a selling viewpoint.

Then he explained what he meant by "old-time" market. The old-time pre-war market was made up of people who had a fixed income from stocks, bonds or other investments. They were the stable, reliable, discrim-

inating purchasers of quality goods.

During the war their income lost its purchasing power, and they, of necessity, either had to buy less or buy things of an inferior quality—and they bought less.

During the war the "floater" came into the market. This class was comprised of the men who, although poor carpenters, for instance, drew high wages as carpenters until the employer could no longer stand for their work, and then they found a job at higher wages as mechanics and later changed to other work.

These people were not discriminating buyers—but they had the price. They paid high prices for goods of inferior quality but which were very showy. They bought because they had the money and the desire to spend it.

The high wages of the war period, however, are passing, and this class of buyer is going. Silk shirts are not being sold. The department stores say that their market has become critical as contrasted with the non-critical market of the war period.

The old-time market is coming back with a higher buying power than before the war, so that the markets should be judged by manufacturers according to the pre-war standards. No longer will the market be satisfied with goods of inferior quality.

There is much in this thought of the old-time market that is of interest to the automotive dealer. Quality and carefulness in buying will undoubtedly predominate and service will also be required. High-priced goods will not move, for the old-time market which is now coming back is a discriminating purchaser and looks to see that value is received for every dollar spent. Quality and service will be the determining factors in making sales.

Inner Tubes and Their Repair

Decision of Pneumatic Tire Manufacturers to Stop Mileage Guarantee on Tires Opens Way to Profitable Repairwork for Garage and Repairman Equipped to Handle Efficient Repairs on Casings and Tubes—Handling Tube Troubles

By H. J. White and Lowell R. Butcher

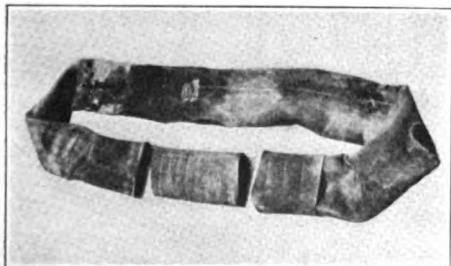
The recent decision by the foremost manufacturers of pneumatic tires to put no mileage guarantee on their tires will favor the garage and repairman who is equipped to handle efficient and workmanlike repairs on casings and tubes. Car owners will no longer return their tires to the maker at the first sign of injury, but will patronize their local repairman, thus making the installation of proper equipment by him a paying investment.

Perhaps the most common repair that the ordinary service station is called upon to make is the repair of inner tubes. Before taking up their repair, it is only proper that the service man should know something about the manufacture and composition of inner tubes. A tire service man must, of necessity, be also a salesman and a salesman should know something about the manufacture of the goods he sells. A repairman sells not only service, but, in practically all cases, new tubes and casings, and so it is important that he be able to talk intelligently about his business.

There are several methods of manufacturing inner tubes. They may be made from many thin rubber sheets—the product called laminated tubes—or they may be made from one thicker sheet of rubber.

The raw rubber, before it is used in tube manufacture, must be purified and mixed with various compounds of tubes of different colors. The rubber is calendered or flattened into sheets of the required thickness by running it through a series of rollers. After calendering, the rubber sheets are laid aside for a time to allow for shrinkage.

The steel mandrel on which the tube is



Tube Turned Back for End Splice.

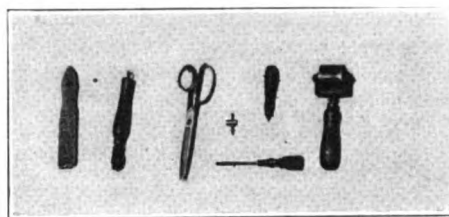
built may be straight or may be curved to conform to the curvature of the tire. The sheet of rubber is cut into strips of the required length and wrapped tightly about the mandrel. The exposed surface is liberally soapstoned and wrapped tightly with cloth, usually a heavy muslin, to keep the tube from sagging during the curing process.

The cure is accomplished by placing the

wrapped mandrel in a large steam heater. The length and pressure of the cure varies with the compounds used in the raw rubber. Two hours at 45 pounds pressure is perhaps a fair average.

After curing, the tube is stripped of the cloth wrapping and loosened from the mandrel by blowing compressed air between the two. The tube is turned inside out as it is pulled from the mandrel, bringing the smooth inner surface—which was next to the mandrel during the cure—to the outside and concealing the marks of the wrapping on the inside.

At this time, the valve is placed inside the tube and the valve pad cemented on. An end splice is necessary to join the ends of the tube. There are two methods of doing this, depending upon the method of curing the splice. The acid-cure method is seldom used, most manufacturers preferring



Tube Repair Tools—Wire Brush, Stitcher, Scissors, Valve Tool, Awl, Screwdriver and Roller.

the quick-cure method. In either case, the splice ends of the tube are buffed—roughened—to give a firmer footing for the cement which is now applied. If the quick-cure splice is used, the tube is placed in a heater for a short time. No heat is required in making the acid-cure splice, the splice is merely wrapped in cloth while the cement is setting.

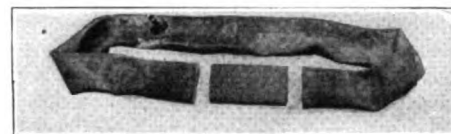
After the end splice is completed, the valve stem is pushed through a hole in the pad and the washer and nut applied. The tube is then inflated, tested and packed.

Inner tubes do not have the size that their capacity calls for—that is, a 3½-inch tube, when filled with air without stretching, will not show a cross-section of 3½ inches. Some manufacturers make their tubes only about 60 per cent of the nominal size. This is to allow for placing the tube in the casing without pinching and is not indicative of a skimpy product. Remembering this, the repairman should never place or recommend the use of a regular size tube in an oversize casing unless the manufacturer specifically recommends the tube for both regular and oversize use.

As the tube is only an elastic container

for the air, the casing must be strong enough to stand the strain of inflation and protect the tube from shock and damage. Failure of inner tubes is more often caused by the condition of the casing than by any defect or weakness in the tube itself.

Many controversies have arisen over the relative merits of different colored tubes.



Splice Ends of Tubes Buffed for Firmer Footing.

The color of a tube is given by the compounding of the raw rubber and it is safe to say that each color has its advantages under certain conditions. A pure grey tube is elastic and capable of good service, while a red tube—antimony compounded—is somewhat tougher and a better heat resistant, but not so elastic and pliable.

Injuries to tubes may occur accidentally or may be the result of abuse and it is important that the service man be familiar with the causes of injury and the best method of repair if the tube is not damaged until worthless.

Common among tube troubles is the ordinary puncture. This may be caused by a nail, or other sharp object, penetrating the casing and making a hole in the tube. In some cases, dirt or grit between the casing and tube will cause a puncture even though the casing has not failed.

A very small puncture is sometimes hard to find. If the hole cannot be found by stretching the tube—a portion at a time—with the fingers, inflate it slightly and plunge into a tank of water. Bubbles rising to the surface of the water can be traced to their source on the tube. It is a good plan to mark the injury at this time, for the puncture may be difficult to find when the tube is again deflated for repair. Every tube should be treated after repair, for the repairman must be sure his work holds and that he has overlooked no other damaged spots on the tube.

The tube repair for a puncture is simple. A hole repair is all that is necessary, but the repairman should examine the casing carefully and remove the cause of the trouble before replacing the tube in the casing.

Blowouts and tears are usually the result of failure in the casing. The fabric becomes weakened from some cause and is unable to resist the pressure of inflation. A

large hole repair, or a splice, is necessary to put the tube in good shape.

There are few blowouts and tears that cannot be successfully repaired by an experienced tire man, but the repairman should never recommend an expensive repair if the condition of the tube does not justify it. A service man who gains a reputation for honest judgment in recommending repairs will profit most in the long run.

A pinch may be caused by running the tire flat or under-inflated. The use of an oversize tube in a regular casing will also cause pinches. A tube may be weakened around its entire circumference by a pinch. When this condition is met with, the tube is hardly worth repairing and the owner will be money ahead to junk it. Smaller pinches may be repaired with the method followed in a hole repair.

Running a tire flat or a shifting rim will cause trouble with the valve and valve base. When the valve base becomes torn, the pad should be placed at another place on the tube and the old hole repaired with a hole repair. If the valve stem is broken by a shifting rim, it is only necessary to replace it.

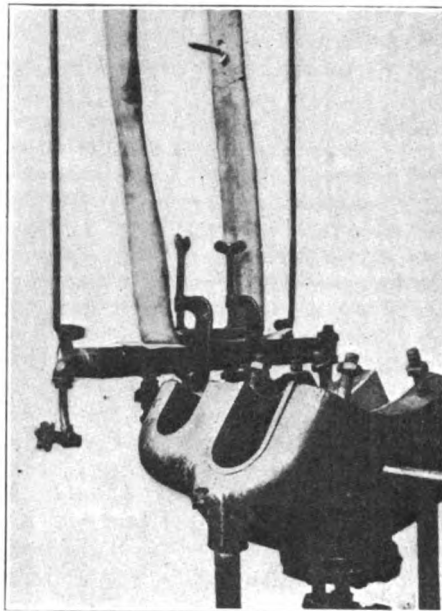
All damages to inner tubes are not caused by use. A tube may be worn out by being carried too long in the tool box. Extra tubes should be neatly packed and carried so that they will not rub against tools and sharp corners. The use of inner blow-out boots will also cause chafing. A boot of this sort should never be used except for a temporary repair to the casing, as it is apt to weaken the tube or shift about the casing. If not chafed too badly a tube may be repaired, the extent of the repair being determined by the condition of the tube.

If an inner tube is left hanging where it is exposed to sunlight and air, it will deteriorate more rapidly than if it is kept in service. This rotten condition may also be caused by age. A tube in this condition should be junked, for any repair made upon it can only be temporary.

Tube repairs consist of patching holes, tears, blowouts, placing new valve pads, replacing valve parts and making new splices. Many different kinds of material and equipment are used in tube repair and a few of the most common are named:

Khaki-backed gums may be used with either patching cement or acid-cure cement. Cementless patches, backed in this manner, are sometimes used for quick repairs. For more extensive repairs, the ordinary cementless patch is occasionally used or plain rubber patches with patching cement or acid-cure cement. Beveled rubber tubing may be used with patching cement or acid-cure. Quick-cure gum may be purchased with or without backing, and may be used with or without vulcanizing cement. Combination backing—cured on one side and semi-cured on the other—and cushion stock, a casing-repair material, should also be included among the tube-repair materials.

Tubes may be repaired without the use of heat but the best and most substantial repairs require some vulcanizing agent. The heat may be applied in a various number of ways. Well-equipped shops ordinarily use



Curing Tube On the Tube Plate.

a flat tube plate heated by steam which passes through it. The repair is clamped to the plate with C clamps or held in place with weights during the curing. Electric vulcanizers are found in some shops, while smaller garages will use a portable steam outfit heated by gasolene or gasolene vulcanizer.

In the gasolene vulcanizer the pressure is applied between two plates tightened on the repair by means of thumb-screws. A hol-

low in the upper plate holds a small amount of gasolene, which is ignited to generate the heat.

Similar to the gasolene vulcanizer is the type that uses saltpeter or acid chips to generate the heat. These are lighted and burn slowly, curing the repair held between clamped plates.

The materials needed for tube repair will consist of cements, cementless patches, tube-filler gum, combination backing gum, khaki-back gum, valve pads and parts, some good gasolene and a few simple tools. A small valve tool is useful in renewing threads and removing valve cores. A stitcher, for working down the raw gum, a roller, scissors and a small awl or plugger complete the tools necessary for tube repair.

The kinds of cement used divide into three classes: Vulcanizing, which requires curing or vulcanizing, patching or air-drying cement, and acid-cure, over which monochloride of sulphur or carbon disulphide is brushed before the patch is applied.

A tube-filler gum of about 1/32-inch thickness is preferred to a shorter cure kind. This thickness of gum will take about 15 minutes for curing and may be purchased in any desired color. Combination backing gum—usually used to back a tube from the inside—may be secured for use with any of the cements named. Cementless patches are used for small repairs and are dipped in a good grade of gasolene before they are applied to the tube.

The acid-cure and the cold-patch method of repair are perhaps the most simple as no heat is required. The cold-patch method is not recommended for a large repair as heat

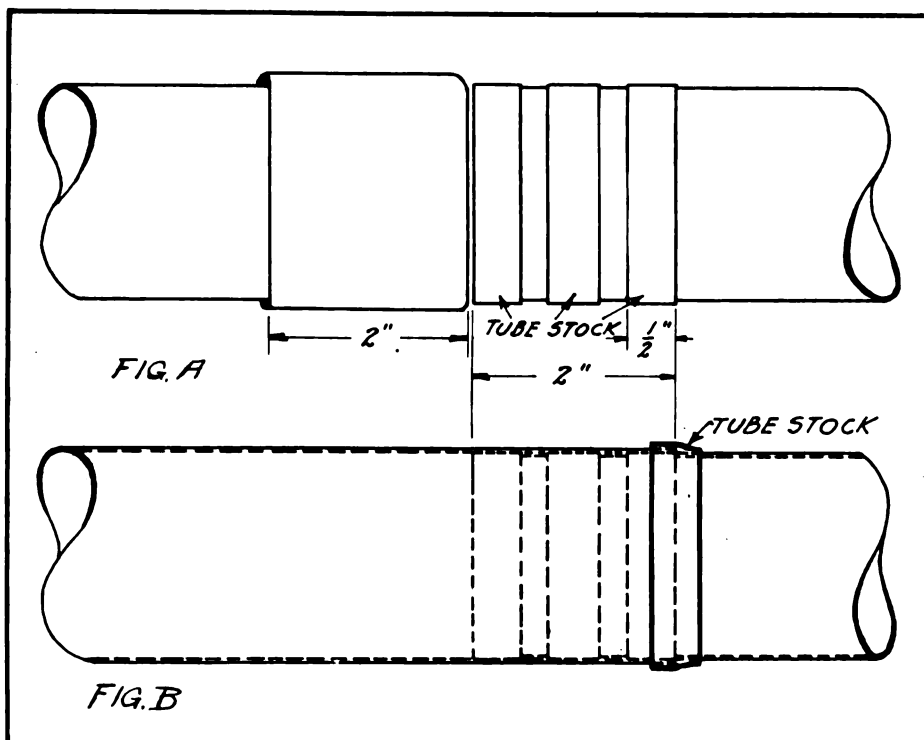


Fig. A. Preparing for End Splice. Fig. B. Joint Lapped Ready for Cure.

and friction will loosen the patch. At times it can be used advantageously for a small repair or in service work where the time is too short to vulcanize the work.

The tube is prepared for repair by roughing the portion of the tube about the injury with emery cloth or a fine wire brush. All dirt and grease should be carefully washed off with a good grade of gasoline or benzine. A coat of cement is applied to the roughened portion of the tube and the patch. Allow this to become "tacky" to the touch and apply a second coat. When this has partially dried, apply the patch to the tube. One coat of cement is sometimes used instead of two, but if this method is followed the cement must be applied more liberally. Roll the repair well until the cement begins to set and place the repair in a clamp for a short time.

If the acid-cure method is followed, the procedure is the same except the acid is brushed on the repair before the patch is applied. The acid-cure patch should be applied quickly, as the curing action of the acid is quite rapid. The tube is prepared for the cementless patch in the same way but the cement is omitted and the patch dipped in gasoline before applying. Pressure should be applied for a short time if possible.

The cure method, or vulcanizing tube repair, is the most satisfactory method of making a dependable repair. Steam is favored as a vulcanizing agent because it provides a uniform heat throughout the cure. Satisfactory repairs may, however, be made quickly with the gasoline or acid chip vulcanizers.

The following method will cover the repair of punctures, small holes and blowouts or tears that befall the tube. A bad blowout or a tear across the tube is repaired with an end splice.

The hole should be enlarged by cutting around it, assuring that the tube is not weakened or split beyond the hole. Rough the tube inside and out with a wire brush or emery cloth. By stretching the hole with the fingers, it is possible to bevel the edges of the hole on the emery wheel. High test gasoline or benzine is used to wash the tube, inside and out, about the hole.

To strengthen the repair, a patch is put on the inside as well as on the outside of the tube. Combination backing gum is used for this, the partially cured side preventing the patch from sticking to the opposite side of the tube.

Cut a piece of this $\frac{3}{4}$ or $\frac{1}{2}$ -inch larger all around than the hole for the inside patch. Cement the uncovered side of the backing patch and allow it to dry until "tacky" before applying. Moisten the inside of the tube about the hole with gasoline to prevent the backing from sticking until it is centered on the hole. Push the patch through the hole, center it on the hole and roll down. Be careful that the patch smooths out in good shape or an unsightly repair will result.

Tube filler gum is used to plug the hole.

Cut this to fit the hole and work down with the stitcher, keeping the center of the repair slightly higher than the rest. Use a strip of $\frac{1}{32}$ -inch thick filler gum, about $\frac{1}{2}$ -inch wide, to lap the edges of the hole over onto the new gum. Cement should be applied before the lap strip is put in place. Roll the repair well before curing.

Clamp the repair under a rubber pad on the tube plate and cure. The time required for curing depends upon the gum used—usually 15 minutes at 45 pounds steam pressure is sufficient. After removing the tube from the plate, plunge the repair in water and pull the tube apart to prevent sticking.

Valve pads may be applied by any one of the three methods of patching. The acid-cure or cold-patch method may be used, but the cured method is usually preferred.

| Size. Inches. | Flat Width. Inches. | Flat Length. Inches. |
|-----------------------|------------------------|-------------------------|
| 30 by 3 | 3 | 80 $\frac{1}{2}$ |
| 30 by 3 $\frac{1}{2}$ | 3 $\frac{1}{2}$ | 78 $\frac{1}{2}$ |
| 32 by 3 $\frac{1}{2}$ | 3 $\frac{1}{2}$ | 86 |
| 31 by 4 | 3 $\frac{3}{4}$ | 83 |
| 32 by 4 | 3 $\frac{3}{4}$ | 85 |
| 33 by 4 | 3 $\frac{3}{4}$ | 88 |
| 34 by 4 | 3 $\frac{3}{4}$ | 90 |
| 32 by 4 $\frac{1}{2}$ | 4 $\frac{1}{2}$ | 85 |
| 33 by 4 $\frac{1}{2}$ | 4 $\frac{1}{2}$ | 87 |
| 34 by 4 $\frac{1}{2}$ | 4 $\frac{1}{2}$ | 91 |
| 35 by 4 $\frac{1}{2}$ | 4 $\frac{1}{2}$ | 97 |
| 36 by 4 $\frac{1}{2}$ | 4 $\frac{1}{2}$ | 98 |
| 35 by 5 | 4 $\frac{3}{4}$ | 91 |
| 37 by 5 | 4 $\frac{3}{4}$ | 98 |
| 36 by 6 | 6 $\frac{1}{4}$ | 94 |

Flat Lengths for Various Sizes of Tubes.

Valve bases may be purchased ready to apply or the repairman may make his own.

If it is necessary to remove a valve pad, remove the valve nut, the bridge and the valve washer and slip the stem inside of the tube. Buff off the old pad or heat it on the tube plate for removal. Patch the hole left by the stem in the usual manner and select a new place on the tube for the valve. Buff off the tube at this point and the new pad to be used.

Cement both with three coats of vulcanizing cement or with two coats of acid-cure or cold-patch cement, depending on the method to be followed. Allow the cement to become "tacky" before applying the pad to the tube and roll well after the pad is placed.

The repairman may make his own pads, using rebuilding fabric and cushion gum, but the cure required on this is much longer and the tube must be in good condition to stand this without injury. Economy may be practiced by the use of valve pads from old tubes. In selecting the tube for this be sure not only that the pad is in good condition, but that the valve-stem hole is not torn or enlarged.

Cut around the pad, following the outline of the fabric—this may be felt with the fingers—and remove the base from the old tube. Buff the under side of the base and the top edge well before attempting to use it. Select a new position on the tube for the valve and cut a small hole for the valve stem. Buff the tube for a radius of from three to 3 $\frac{1}{2}$ inches about the hole.

Any one of the three methods of patching can be used to apply the old base, but the cure method is preferred. Apply three coats of vulcanizing cement to both the under side of the base and the tube about the hole. A layer of $\frac{1}{32}$ -inch thick cushion or tube stock is cut to the shape of the pad and placed on the tube. Work the gum down with the roller and stitcher before applying the pad.

After the pad is placed, a coat of cement is brushed about the edges and a strip of cushion or tube stock used to lap the edges. Roll the pad well before placing on the tube plate for cure. The length of cure will depend upon the kind of stock used—25 to 35 minutes, at 45 pounds' pressure, is about correct.

It must be remembered that the valve stem should always be placed inside the tube before the old valve position is repaired, as the stem should never be forced through the new hole.

The metal parts of a valve assembly consist of the valve stem, the valve locknut, the bridge and bridge washer, the valve core, the valve cap, the dust cap and the rim nut. Valve cores frequently cause trouble when they become worn or are removed to deflate the tube. Test the valve before the repair leaves the shop. Valve threads that are battered can be cleaned up with tap and die on the threading tool. In replacing a valve, be sure that the valve nut is firmly in place, for a tantalizing slow leak may develop if this is neglected.

Perhaps the most difficult tube repair is the end splice, necessary if the tube injury is in the form of a bad blowout or a tear across the tube. Leaky splices are often repaired by cutting out the old splice and putting in a new section of tube. It is necessary to make two-end splices in a repair of this sort. Tube sections of the correct size may be purchased or sections of used tubes taken for the new section. If old tube sections are used, they must be in good shape to stand the length of cure necessary in an end splice.

A splice may be made, using any one of the three methods of repair mentioned, but splicing is a difficult art and the vulcanizing method described usually gives the best results.

About four inches is required to make a good splice; that is, the section to be put in should be about four inches longer than the section taken out. This will allow a 2-inch lap at each splice. If the section to be spliced in is new, it will probably fit inside the tube, which will be slightly stretched from use. In any case, find out whether the section fits best inside or out and buff for the splice accordingly.

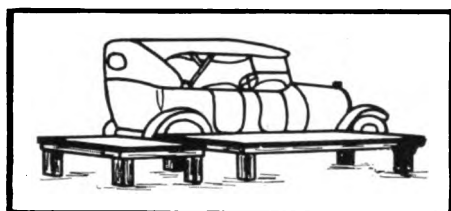
Turn back the ends of the tube or section—depending upon the way in which the new section is fitted—or, in other words, the part of the tube or section that fits outside is turned back for the length of the lap, two inches. Three strips of tube or
(Concluded on page 30.)

Repairing the Automobile Top

Top Repair Department Can Be Made Reasonably Profitable to Garageman and Does Not Involve Difficult Labor Problem—Some of the Equipment and Tools Needed and Method for Making Repairs—Other Kinds of Top Work

By S. E. Gibbs

Automobile top service has not been provided in the average garage. Most of this work has been taken to the large city service stations, done at home with the aid of



Benches on Three Sides of Car.

a mail-order kit, or in many cases left undone.

A top repair department can be made reasonably profitable in any garage. It does not introduce a difficult labor problem, as almost any careful workman can, with a little practice, turn out a first-class job. The investment required for equipment is comparatively small—in fact, all of the equipment except the sewing machine and a few hand tools can be made by the workman.

The space to be used for top work should be well lighted and large enough for at least one car with room for the workman on all sides of it, a top stand, a laying-out table, and a sewing machine.

In the majority of cases the top can be repaired on the car. This method is probably best, as the top can be fitted just as it will be when in use. A framework should be provided for this type of work, so that the workman can walk around the car and be at the proper height for easy work. The exact height depends largely upon the height of the workman, but the average will be about 18 inches.

Three small well-built benches will serve well for this type of work and can easily be stored when not in use. A temporary stand can be made by placing boards upon four wooden horses but, as this is not substantial, the workman must be more or less careful and cannot work with a feeling of maximum security.

In a shop where a large amount of top work is done, a platform across one end of a room, which is provided with stalls into which the cars can be backed, will prove very satisfactory. The lay-out table and sewing machine should be placed on this platform so the workman can walk to and from his work with ease and without climbing or being in danger of falling.

A lay-out table should be used for all laying out and cutting. It should be about 6 feet wide, 13 feet long and 30 inches high. The legs at one end can be extended

and fitted to hold three or more rolls of top material, thus keeping the material in good condition and always handy when a piece is needed.

A few hand tools are needed. A small hammer, a tack puller, a heavy pair of shears, a few small cold chisels, a nail set or small punch, a carpenter's square, a 10-foot, straight-edge, a yardstick, and a plumb-bob will be sufficient for an ordinary job. Several special tools will be needed for cutting openings for and installing curtain fasteners. The workman in the top department should wear an apron which has pock-

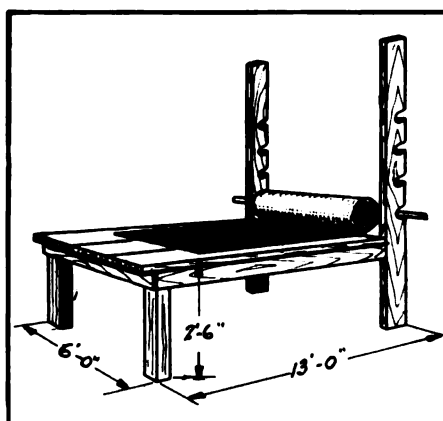
Carefulness is the most essential thing in connection with top work. The greatest claim for this kind of work is that each job is tailor-made and will fit perfectly regardless of the condition of the body. Speed can easily be developed after one has learned to do good work.

The old top should be removed from the frame, piece by piece, using the hammer, cold chisel and tack puller as tools. The construction should be noted carefully, as the new top will probably be sewed together in a like manner but in reverse order to that used in tearing down.

The new pieces should be marked out on the top material by using the old parts as patterns. Care should be used to make allowance for stretched and torn pieces, and extra material should be left for fastening the parts together. All metal fastener positions should be marked when laying out but should not be punched until the parts have been fitted to the frame. All square corners and straight edges should be checked by means of the square and straight-edge.

The top frame should be placed in good condition before the top is fitted or put in place. Broken or defective bows should be replaced. If the wrapping is in poor condition on the bows it should be replaced or at least dyed.

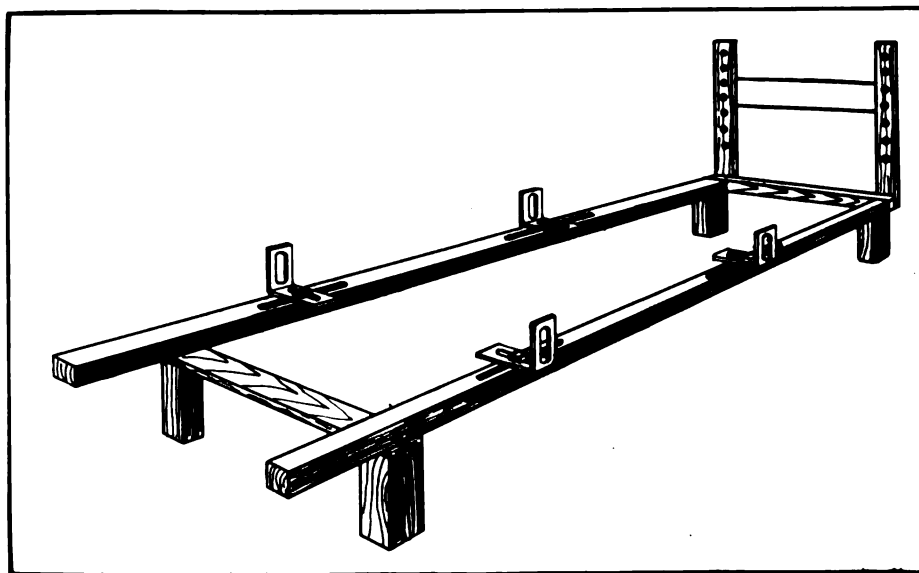
The bows should be lined up by passing heavy canvas straps over each side, these straps being drawn tight and tacked in place. The front bow should fit down over the wind-shield and be parallel to the top member of the shield. The center bows should be vertical. The back one should be



Layout Table Fitted to Hold Material.

ets provided for carrying the hand tools which are used at frequent intervals.

The sewing machine should be of extra heavy construction and, if motor-driven, will prove very easy to operate at a fair rate of speed after you have had a little practice.



Top Frame Used When Top Is Repaired Off the Car.

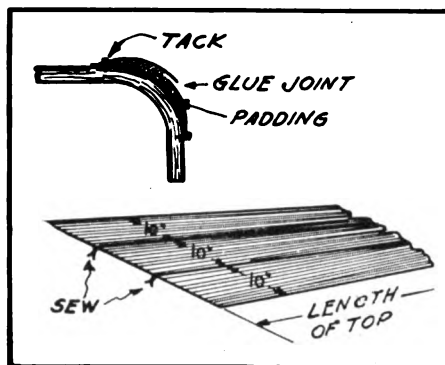
gaged by the length of the strap that fastens it to the back of the body and be parallel to the back of the car, or so the curtain will be of equal lengths on each side.

Next, side pads should be put in place. Some firms buy the side pads complete for standard makes of cars but most of the larger top concerns make a new cover and use the old padding. If the covers are in good condition, they can be dyed so as to match the rest of the top lining and used without changes.

Now the back curtains and rear quarters should be fitted. A plumb-bob should be used to make sure that all vertical edges are in proper alignment, as a slight mistake in this part of the work is very easily noticed. Before the curtain and quarters are fastened permanently in place, all metal fasteners should be located and put in place.

The two side quarters are next temporarily tacked in place. They should first be tacked at the front and then the workman should proceed toward the back, making sure he is leaving no wrinkles.

The edges of the deck are then turned under and tacked lightly in place. More or less fitting is usually required before a neat job is obtained. Next the side curtains should be fitted and, if necessary, the



Method of Preparing the Side Pads.

top parts should be shifted so that they will fit. When the various parts are in place and the fit is satisfactory, the edges should be marked with chalk so that they can be sewed together properly. If the points where the top crosses the bows are marked, the cover will be as easy to fit as it was before sewing.

When the pieces have been removed the edges should be trimmed down to the desired size, leaving enough material for flaps for sewing. Then the parts should be sewed. While at the machine all ising-glass should be sewed in place.

After sewing, the top is ready to be tacked in place permanently. The extruding edges are removed and the seams and edges are covered with tape where required. If no tape is to be had, a piece of carefully folded top material can be used very satisfactorily, but requires a bit more time to put in place.

There are many kinds of top work besides the making of new tops. Special curtain jobs are very popular at present. Back curtains of modern design sell at a nice profit. Then there is a multitude of minor repairs which can profitably be done. The sewing machine can be used for a number of jobs such as awning, tents and other heavy sewing during slack times.

Rear curtains, side curtains and complete top covers can be made up during spare time for standard makes of cars. This enables the workman to do a quick job when business is rushing and keeps him busy during slack times. Seat covers and radiator hood covers can be made in the top department, and will prove very profitable, especially for cars that cannot be fitted out from jobbers' stocks. A good line of top dyes and dressings and special fittings will sell well to those who like to do some of their own work.

Selling the Second-Hand Car

Getting Most Out of Old Car Depends Upon Its Condition When It Arrives and When It Leaves—Adaptability in Repairing and Supplying New Parts Must Be Considered—Some of More Important Phases of Repair Work Discussed

By J. N. Bagley

Getting the most out of the old car depends upon the condition it is in when it arrives as well as the condition when it leaves.

Naturally, the first thought that comes to the second-hand dealer when the old car is ushered into the place is how much money should be expended to put it in a salable condition. Not particularly a salable condition either, but in a condition that will make it sell readily and at the same time be such that it can be sold to a friend and the friendship of the buyer retained after he has owned and used the car for one, two, three or even six months.

Of course, much will depend upon circumstances and conditions, and there can be no set rules as to the amount of money to be expended. No two cars will require exactly the same outlay to put them in good condition. Therefore, the eagle eye of the dealer must scan the situation and estimate, in each instance, the cost in new parts and labor which will be required to put the car in a condition that will make it both salable and serviceable. At the same time, he must be in a position to determine whether or not the expenditure will be advisable in order to make the transaction satisfactory and profitable to all concerned.

Unless the dealer is an experienced man, it is a difficult matter to figure overhauling and repairing from an economical standpoint. For instance, the fitting of a new carburetor to a certain type of engine might require a great deal more time than to fit the same carburetor to some other type. Then again special fittings might be necessary, which would greatly increase the cost of installation. These conditions apply also to the fitting of magnetos, etc.

Therefore, the first thing to consider in buying a second-hand car is the question of ease of adaptability in repairing and supplying new parts, and whether or not the new parts can be had from the manufacturer at a nominal cost. This fact not only affects the second-hand car dealer but the prospective buyers as well, for few people care to invest very heavily in automobiles when repair parts cannot be had through the regular channels.

There was a time when a coat of paint would sell the car, regardless of the condition of the rest of the car, but that day is past—considering the country as a whole. Painting will add to the value of the car, no doubt, but if either is to be neglected better the paint than the machinery.

The writer recalls an instance, a few years ago, when a prominent business man

went to the city to purchase a car from a dealer. The car looked like new and the price was low. The dealer's story was something like this: "A certain doctor purchased the car a year ago and died shortly after and a few days ago his widow, needing money, had it brought to me to sell and here it is."

The result was that the buyer didn't get home with it until it fell to pieces—yet it looked like new, and he couldn't figure out how a new car could be so badly used up. The fact of the matter was that the car was worn out before he got it. He sent the car to the factory and had it rebuilt and when it came back it looked and worked like new—in fact, it was practically like new.

How much better it would have been for all concerned if the dealer had put the machinery in such condition that it would have worked as well as it looked. When both appearance and performance are good, they sell for more money and, in nearly every instance, the buyer is satisfied while the dealer makes a little money.

The second-hand dealer, these days, must get down to "brass tacks" and deliver the car in such condition that it will give actual service, if he expects to stay in business for any length of time and have friends

(Concluded on page 30)

Some Business-Stimulating Ideas

Pittsburgh Firm Originates A Plan for Bringing in Prospective Tire Purchasers
If You're a Good Fisherman, Here's an Idea for Your Display Window—Effective Newspaper Advertising Campaign Inaugurated by New Orleans Dealer.

Caught Tire Prospects Red-Handed.

Last July the Bigelow Supply Co., 3725 Bigelow Blvd., Pittsburgh, arranged a large display of tires and exhibited a large and attractive sign that read:

"INSURE IN A SPARE."

It was figured that this plan would catch the eyes of those who traveled along the sidewalk before the store, or who parked in that vicinity. Then a plan was arranged to catch the attention of the hundreds of potential prospects who traveled along that thoroughfare to and from their business, or on pleasure trips.

H. J. Blackburn, the firm's manager, has a younger brother and he was drafted to carry out the plan. He was given a pad and pencil and asked to stand in front of the store and jot down the numbers of the cars which he observed to be running without spare tires. He got a long list every time he was on the job.

From the state highway department the store had secured, at a cost of \$25, a list of the owners of the license numbers. As a bunch of numbers was secured, each was compared with the list. If the party lived within the city and the shopping district of the store, or was considered as one who traveled that route regularly, a letter was filled in to give it the personal letter style and promptly mailed to the prospect. The letterhead carried the slogan: "Just Across the Street From Goodyear."

Without sufficient capital to carry on a

many who had put off the purchase of a spare because of the human tendency to procrastinate. This made up for the writing to any whose funds might not allow the investment in a spare.

While the campaign was ended sometime ago, the effects are still seen every week or so.

Another fruitful method which the firm

Dear Sir:

When your car passed our store the other day, it was noticed that you did not carry a spare tire.

Of course you intend to get one. You know the trouble and inconvenience it is to change tires, whether on business or pleasure. An extra tire quite often acts like insurance—if you have it you don't need it, but when you don't have it???

Here are Goodyear and Goodrich tires in stock. Not a tire or tube in the store over thirty days. Our location makes possible a minimum stock and a quick turnover.

Better drop in and let us fix you up for that holiday or vacation trip. Don't run chances of having your outing spoiled. You need a spare tire anyway.

Yours sincerely,
THE BIGELOW SUPPLY CO.
H. J. Blackburn, Mgr.

Copy of Letter Mailed to "Spare Tire" Prospects.

fish in the center of the window. A small sign told the many spectators the fish's weight, length and the place where it was caught.

All the time while the fish was in the window on display a crowd lingered to exclaim over the size and weight. In addition to the local interest which the display aroused was the account which the morning Herald gave with the photograph of the fish.

The plan is very suggestive for garage-men who are real fishermen.

Effective Newspaper Advertising.

The Abbott Automobile Co., of New Orleans, has struck a distinctive and creditable note in the advertising it has run for some months in the Crescent City newspapers. This campaign has been based on a definite program which, if not unique, seems to have been new to this industry and city. The underlying plan may be applied as effectively by dealers elsewhere.

The examples show that the Abbott company made it easy for those glancing through the papers to pick out its announcements. The border, lower cut, and address are identical, even when the program is interrupted to note price changes or proclaim special activities for a certain day.

It is a lay-out of 21 column inches, well calculated to catch the errant eye. Interrogation of many newspaper readers discloses the fact that the Abbott series has impressed many not yet admitting an interest in automobiles and disposed to avoid

Abbott Brought the First Packard to New Orleans 17 Years Ago

No little dissatisfaction has been caused to motor owners by the switching about of agencies or the changing of cars. Permanence of representation is an asset for any dealer and a great advantage to the owner.

The Abbott Automobile Co., is proud of its record of being the oldest PACKARD dealers in the country, having distributed this great car in the New Orleans territory CONTINUOUSLY since 1904.

Care of undisputed leadership, housed in the most modern automobile quarters in the South, backed by a maintenance service second to none, and amply financed—that's what the word ABBOTT means to the automotive industry here.

Will You See Us—
Or Shall We See You?

ABBOTT AUTOMOBILE CO.
OLDEST AUTOMOTIVE
DEALERS SOUTH
Established 1897
2001 St. Charles Avenue
Phone JACKSON 1100



Abbott Advertising Is Distinctive.

large newspaper campaign, the firm had to make use of its opportunities. This letter brought to the store many men who had never been in before and who might never have come in. It also served to remind

utilizes to make use of spare time is to keep in touch with customers or prospective customers by means of the telephone.

An Unusual Window Display.

The Madison Square Garage, located near Madison Square, Grand Rapids, Mich., recently had a window display which attracted the attention of practically every person who passed by this new and up-to-the-minute garage. Indeed, so unusual was the display that the newspaper reporters called on Mr. Sloomaker, one of the proprietors, and, after interviewing him, took a picture of the "center-piece" in the window. Thus the garage obtained more free publicity.

To explain this display, it is necessary to mention that "Andy," as everybody calls Mr. Sloomaker, took a day off and went fishing at Spring Lake not far from Grand Rapids. He saw only one fish—and got him—but it was an unusual fish. This was a muskallonge, 46 inches in length and weighing over 25 pounds.

Mr. Sloomaker took his big catch and returning to his garage built a special pan, filled it with ice, and placed the monster

"Maintenance" at a Fair Charge—Not "Free Service"

The Abbott System of keeping "Packard" and "Franklin" owners satisfied with their cars is based on carefully planned methods, efficiently executed by trained and capable men.

The policy of "Something for Nothing" has no place in the modern business world and usually costs more in the long run. Abbott's Maintenance Department is an efficient organization selling its service at a fair price.

Will You See Us—
Or Shall We See You?

ABBOTT AUTOMOBILE CO.
OLDEST AUTOMOTIVE
DEALERS SOUTH
Established 1897
2001 St. Charles Avenue
Phone JACKSON 1100



Another of the Abbott Series.

rather than consult automobile advertisements.

This series has taken up one by one—with unusual regard for unity—the different personalities making up the Abbott

organization, the essential facts of the company's history, and the important details of its merchandising and service policies.

It is, of course, an advantage for the public to become familiar with the personal elements in an impersonal organization. It is desirable, also, if the public is to feel so acquainted, for a company to use advertising columns for the introductions in preference to dragging the pictures and names into news columns by "hairs" of flimsy news value. There has been so much of the latter that the public, to save its time, has become wary of write-ups. These do not generally have the directness of Abbott introductions, two samples of which are shown in the illustrations.

That regarding Ginder Abbott might as well have had his picture as the one regarding Mr. Aucoin. Note, however, that both bring out only the essential points regarding the men. Incidentally, employees as well as the public are bound to react favorably toward the organization that is proud of its members and that takes pains to credit them for the parts they have played. The remark that Mr. Aucoin has been "23 years in the Abbott service" is impressive in its suggestions.

Similarly, the statements that the Abbott Automobile Co. brought the first Packard to New Orleans and is the oldest Packard dealer are meaning bits of history, just as the disclosure of the fact that this is an organization for selling service at a fair price is an effective item regarding merchandising policies.

All in all, this series seems to have attained a standard worthy of emulation by automobile dealers and furnishing practical examples of publicity. How many will pay it the highest compliment—that of imitation?

Unique Lubrication Service.

As the advertisement illustrated suggests, there has been started in New Orleans a new marketing service as a constructive move on the part of one of the lesser oil companies to claim a larger demand for its products. Opinion regarding it is divided, some garage proprietors believing that it

Proper Lubrication Means Slower Depreciation

WHAT WE DO

Drain, wash, refill;
Radiator, Motor, Transmission Clutch
and Differential.

Clean and refill with greases;

The steering gear case; all hub caps; universal joints; grease cups; spring leaves; oil cups.

There are more than one hundred units in an automobile that demand careful attention and regular examination. All this work is done by LUBRICATION EXPERTS in less than TWO HOURS. You are then furnished with a written report, detailing exactly what has been done and also with a memorandum of such suggestions for mechanical adjustments as our lubrication inspection may reveal.

What We Charge

For this expert service there is no charge whatsoever—you merely pay us for the exact amount of oil and grease as detailed on the report. All materials used are the Marine Oil Company's.

Thermal Oils

Voltec Gasoline

Perfecto Greases

1025 Carondelet Street
Just Above Howard Avenue

You can pass our door without going out of your way, and it is a habit worth cultivating.

5% DISCOUNT ON
OUR COUPON BOOKS

MARINE OIL CO., Ltd.

The New Station is at 1025 Carondelet Street—Main 1950
The Main Office is at St. Charles and Julia—Main 4231

Advertising a Popular Lubrication Service.

goes outside the proper province of the oil company and some welcoming it.

Those of the latter class either are glad to be relieved of a dirty job, the proper performance of which many car owners pay for grudgingly, or expect the oil company to recommend mechanical service that is needed, but would not ordinarily be gotten until breakdown occurred, or think it will help make the public more systematic and careful.

Still others have already taken up with different oil companies, whose products they sell, propositions for rendering similar services on the oil companies' rather than on the customers' accounts.

If this service is not unique, it appears to be wholly new to the South, and quite original with J. M. Hudson, vice-president of the company inaugurating it. The essential details may be gathered from the advertisement.

A favorable location was secured and the project was well-advertised, daily change of copy informing the public of the progress made in preparation of the station. This had a "teaser" character, in that neither the fact that the service was to be free of charge nor its exact nature was given in advance of the opening. Records are prepared and maintained regarding each car, and patrons are to be notified by mail when the cars seem due for fresh lubrication.

The station has been equipped and manned to do the work thoroughly and quickly. Although there are at present only six racks—on which the cars are run up to be high enough so they can be worked at conveniently—the site will accommodate many more.

Two men are assigned to each rack, under a competent foreman, and there are two shifts to give service from 7 a. m. until midnight, this force having a maximum output of about 50 cars with the present equipment.

The men are expert mechanics, especially instructed as to the proper use of oils. They are provided with the best appliances possible, such as those for applying spring lubrication under pressure and force pumps for the kerosene with which transmission case, clutch and differential are cleaned.

In spite of inclement weather, the first few weeks were so encouraging that the company is already planning extensions.

Localized Testimonials.

Here's an idea for something that is a little new in the way of local advertising by a dealer in his home-town papers. Instead of running some of the ready-made advertisements furnished by the manufacturer, or the stereotyped phrases telling how good the cars you are selling are, why not run a small advertisement reading about like this:

Today's Nicest Local Compliment on the Cars We Sell.

A. D. Sawyer, prominent local attorney, who has been a Blank car owner for five years, says:

"I've gotten so much real satisfaction and enjoyment out of my Blank car that I feel as though I never want to drive any other make."

Why don't YOU buy a Blank car from us and get the same kind of joy and satisfaction?

The dealer might run a series of these advertisements—one a day—for a couple of weeks or possibly as long as a month.



Emile Aucoin is the Diagnostician at Abbott's

Into every piece of machinery, even that as perfectly constructed and designed as the PACKARD and FRANKLIN automobiles, some little troubles will occasionally come. These troubles are small and easy to remedy once they're located—and so we have turned over to Emile Aucoin, the delicate and all important work of diagnosing motor troubles and telling other experienced mechanics how to correct them.

"Emile" is known and liked by every Packard and Franklin owner—because he knows his business and backs this knowledge with an interest bred of 23 years in the Abbott service.

Will You See Us—
Or Shall We See You?

ABBOTT AUTOMOBILE CO.
OLDEST AUTOMOBILE
DEALERS SOUTH
Established 1897
2001 St. Charles Avenue
PHONE JACKSON 1100



Personal Note in Abbott Advertising.


For 25 Years—Ginder Abbott Has Studied Automotive Problems

The pioneer automobile dealer of the South, Mr. Abbott early sensed the great future that was in store for gasoline-driven vehicles and set about to study the industry from every angle, particularly that of the specific requirements of every purchaser.

Selling automobiles is not the big thing at Abbott's—but selling motoring satisfaction—actually studying each customer's needs and offering constructive suggestions that make for economy and pride of ownership—these are the "selling points" inaugurated by Mr. Abbott and faithfully followed by every Abbott salesman.

Will You See Us—
or Shall We See You?

ABBOTT AUTOMOBILE CO.
OLDEST AUTOMOBILE
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PHONE JACKSON 1100



Abbott's is Proud of Its Organization.

Welding, Cutting and Brazing Practice

Previous Articles Have Mentioned the Tools Which the Welder Must Have to Do Fusion Welding—Other Pieces of Welding Equipment of Almost Equal Importance—Some of the Things You Need for Handling Heavy Jobs

By David Baxter

In the previous chapters we have discussed the actual welding apparatus, together with other paraphernalia which the welder will find useful—that is, the things he must have in order to do fusion welding and the things he should have to make his shop complete. Those include the gas supply and its delivery control and consumption, the gas tanks and piping, and the welding and cutting torches. In the secondary outfit the carbon torch and the brazing torch are included.

He must have the appliances included in the primary outfit to do any welding at all. The secondary list should be on hand in every shop to keep the welder busy in the event that there is no fusion welding to do.

There are a number of other pieces of equipment, however, which are of almost equal importance. That is, in order to insure and facilitate his work, the torch welder should have a number of things such as are enumerated in this article. In many cases, he may substitute appliances of different design.

The oxy-acetylene torch operator, who is especially concerned with garage work or the repairing of automobile parts, should have, and become familiar with, the appliances which will now be described, or other similar tools.

As a starter, take the leveling plate, which is almost indispensable in welding many different automobile parts. Usually it is made of cast iron, from one to two inches thick and two feet wide by three

feet long. At least one flat side and one edge should be machined true, the edge to be square with the machined side. In addition there should be a number of holes and slots through the plate. These holes and slots should be cast in, as this is much easier than cutting them afterward.

The machined surfaces of the leveling plate are for the purpose of aligning broken castings and bent forgings. The holes and slots assist in the alignment, and are also useful where it is necessary to clamp the part down. The machined corners are for use in squaring angles.

Such a plate may be used on the floor but it is much more convenient to arrange a metal table upon which to keep it. This table may be made especially for the plate, or it may be a combination welding and preheating table—a form which is very convenient for the small repairshop since it enables the operator to concentrate his work. For instance, the broken parts can be clamped and spot-welded on the leveling plate and then rolled over onto the preheating section of the table.

To make this plate out of cast iron forestalls any tendency to warp or spring out of shape like a steel plate. The thickness is also an important consideration.

A single or a combination table is easily made in the welding shop with no tools other than the torches. The legs may be made of second-hand pipe, or of angle iron. An angle-iron frame for the top will be found to be substantial. The whole thing is cut with the cutting torch and welded together. A convenient size for the combination table is 32 inches high by three feet wide, by five feet long, although a table two feet wide by six feet long has many commendable features.

Where a separate table is used for the leveling plate, the welding and preheating table usually carries a fire-brick top, which is recommended for its non-conducting and heat-resisting qualities. The preheating device is usually located at one end of the table.

Either of the types mentioned enables the welder to do better and quicker work and is not so laborious as attempting to do all the work on the floor. There is not the risk of fire that attends the welding on an ordinary work-bench. However, the welder, as stated, is free to change the design of his table equipment as best suits his shop conditions.

Under the head of shop equipment, the welder should have—besides all of the customary hand tools, such as hammers, files,

chisels, wrenches, drills, etc.—a good, substantial bench vise, as it is very handy for holding articles while bending, straightening, and removing parts of various repair jobs. Also, there ought to be a portable



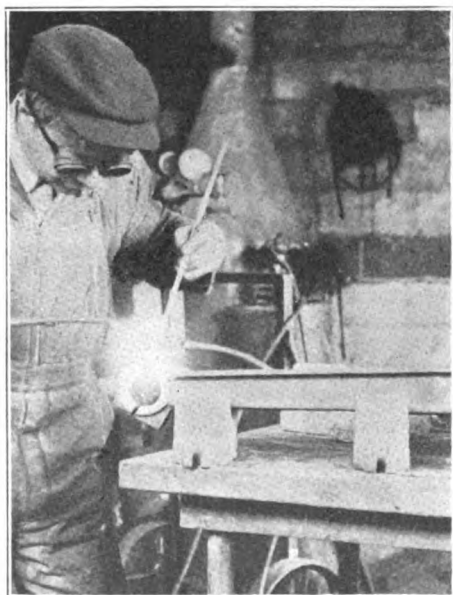
"Some More Equipment for Welding Shop, Including a Bench Vise."

emery grinder in every shop where it is possible to operate it.

This handy device saves many hours of time and much arduous labor in preparing jobs for welding. For such work as beveling and grooving it is also much safer than the hammer and chisel method, with which there is always the danger of enlarging the fracture or lengthening the crack. Of course, there are instances where the grinder can not be utilized, but in a large percentage of the work it can be used with telling effect.

Then, too, the portable emery grinder is better for finishing a rough weld as there is not the danger of re-breaking the welded job. It does not require the time usually taken in filing and chiseling, and it makes a neater appearing piece of work. But it should be remembered that the portable grinder can not always be used for this class of work. Parts of some welds must be dressed with a file, chisel or lathe.

The portable emery grinder will serve a double purpose as it may be made into a stationary machine very easily merely by welding a stand or rack in which to clamp it to a work-bench, such as is shown in one of the illustrations. Small jobs may then be ground at the bench, or the grinder



"The Leveling Plate as a Part of the Welding Table."

can be removed from the brackets to operate on heavy jobs.

Another piece of welding shop furniture which the oxy-acetylene torch operator will find extremely convenient—in fact, almost absolutely necessary—is an anvil. It need not be an expensive, solid steel anvil but may be one of a cheaper, cast variety similar to that illustrated. The same illustration shows a substantial home-made stand, constructed of sections of discarded gas pipe welded together with short pieces of smaller pipe and angle iron.

The anvil is useful to the torch welder in a variety of ways—such as drawing out chisels, straightening and flattening rods, backing out small rivets and bending or shaping round or flat bars of wrought iron or steel. In fact it will be useful in any small job where light sledging or hammering is needed.

The illustration showing the anvil also shows another tool that is quite essential to the welder. This is a steel-wire hand brush, or a "scratch brush" as it is often called. It is handy for removing paint, rust, grease or other sticky substances from the welding job. It is especially handy for removing non-metallic matter and rust from the near vicinity of the line of welding, previous to the actual fusion. The metal along the fracture or joint, in every job to be welded, should be thoroughly cleaned before the welding is started. There is probably no more convenient way to do it than by scratching it off with a steel-wire brush.

Nor is the garage welding-department equipment complete without at least one set of V-blocks. If possible, there should be several sets of them in different sizes. They are employed principally in tube welding, such as axle and drive-shaft housings, and the welder can scarcely get along without V-blocks when welding crankshafts. One use of these devices is shown



"Portable Emery Grinder Readily Made Into Stationary One Indispensable for Grooving Small Welding Jobs."

in connection with the leveling plate. In this particular instance, they are used to prevent the connecting rod from tipping over.

Even though the welder does nothing but automobile and truck repair in his shop, he should have some sort of equipment for handling heavy jobs. This can be either a portable crane or an overhead trolley system. The latter is no doubt the best, since additional tracks can be hung whereby the job may be shunted to different departments without unloading. The track can be extended outdoors so that the heavy jobs can be loaded or unloaded to or from the dray.

The system need not be elaborate but may consist of a small, four-wheel car, from which is suspended a common chain block, of say a half-ton capacity. If the track is strong enough, this will lift the heaviest automobile engine quite easily. It is nearly always necessary to take the engine out of the car and strip it before any welding is done. This is a difficult, laborious job when done by hand if the car is a large type, but with a chain-block trolley the cylinder-block casting can be taken directly to and from the preheater.

Most of the larger equipment needed has now been enumerated, together with reasons and uses. Some of the smaller and seemingly insignificant equipment will now be considered. The first, and perhaps the most important, of these is colored goggles. No intelligent torch welder will do any fusion welding without colored glass goggles. Even jobs of short duration are harmful to the eyesight. The baleful effect may not be noticed at the time but it will show up sooner or later.

Some welders prefer one color and some another. Whichever is chosen, he should have more than one pair—each of a different density. It is not good practice to use a very dense glass for jobs requiring a small welding flame, nor should a lightly colored glass be used for jobs requiring a large flame. The eye strain is practically the same in either event. In the one the strain of constant peering is as bad as the intense glare of the flame in the other. A truly scientific way would be to have at least three pair of goggles of graduated density.

The goggles should be of glass—never of celluloid or other composition, as there is too much danger of the latter catching fire. The glass may get hot enough to crack without harming the eyes but, if the celluloid ignites, the welder has scant chance to escape the loss of both eyes.

Modern goggles have an outer lens of clear glass, which serves both as a protection to the eyes and as a safeguard to the colored glass. It is amazing how much the goggles protect the eye from infinitely small bits of flying metal and slag. An examination of any pair of goggles that has been in use for several weeks will verify this. The outer lens will be a mass of tiny cuts

and clinging bits of slag—probably all unknown to the welder who wore the goggles.

In closing this chapter, it may be well to state that one very important article of equipment has been purposely omitted. This is mainly because it is deserving of



"Cheap Anvil Very Handy Piece of Welder's Equipment; Also a Steel Wire Brush."

a special chapter, and secondly because there is not sufficient space to do justice to the subject here.

This important appliance is what is known to the welding fraternity as the preheater. In other words, it is a device utilized to heat certain jobs previous to applying the intense heat of the welding flame. Some welding jobs must be heated to control expansion and contraction, while others are heated to assist in the fusion of the metals.

The preheater is also employed to reheat or anneal the welded job in some cases, so that the preheater, as we shall discuss it in another chapter, might well be termed the reheater.

N. A. C. C. Issues Handbook of New 1922 Automobile Models.

One hundred and fifty-five models of motor cars are shown in the 1922 handbook of automobiles, which has just been issued by the National Automobile Chamber of Commerce, 366 Madison Avenue, New York.

The book is a ready guide to the general appearance, price group and specifications of the principal models of automobiles and motor trucks being produced this year by the leading manufacturers in the United States who are members of the N. A. C. C. The gasoline passenger-car section illustrates 155 models with 70 in the gasoline commercial department and five in the electric vehicle division.

Glimpses in the Garageman's World

Merchandising Plans That Others Have Found Helpful—Minnesota "Freeair" Station Gives An Unusual But Practical Service—Unique Map Advertisement Gets Message Across That Small Space Would Not Otherwise Permit

Hints From Other Establishments.

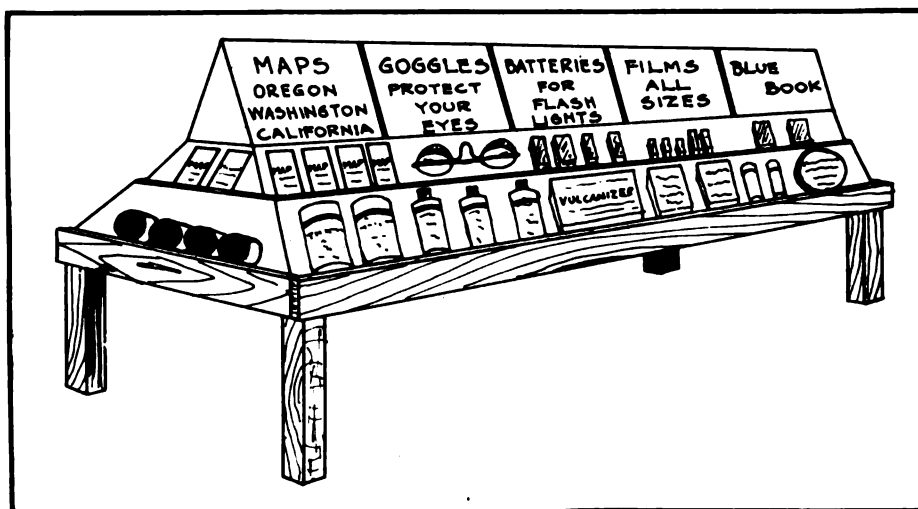
When a garageman, with an opportunity to stock some side line that is in harmony with the balance of his stock, comes to consider the ethics of the case, he will do well to remember that in these days of merchandising the boundary lines defining each line of business are somewhat indistinct. A druggist in Georgia has found that tires work well with him as a side line. One in Nevada maintains an agency for a car.

A side line recently put in by the Ralphs Grocery Co., Los Angeles, was the automobile tire line. This firm maintains over two score of cars for delivery and that, of course, meant quite a tire bill. The stock was started with this demand as the nucleus. Then it was decided to merchandise them and they were given a prominent place and advertised.

The results were gratifying. It was found that a great proportion of those who entered the store to buy foods owned tires. They had confidence in the store through past dealings and began to buy tires. Now the line had developed into a sure enough profit-producing class of merchandise with many opportunities to get it before the shoppers.

In line with showing the extra items, is the experience of a dealer in automobile accessories who also wished to sell the "things that go along with the automobile outings."

When the out-of-door season opened this live merchandiser of Oregon arranged a display that suggested the various things a person would need to complete the pleasure of the outing. This store has a table with four sloping sides. These slop-



Automotive Accessories Displayed On This Ingenious Table Attract Attention and Sales.

ing sides end in a narrow platform. Usually the table is covered with small-item merchandise, with the level top used to pyramid the display.

Two lids from phonograph cases were joined by hinges and set on the level top. These lids, of light wood, had been given a coat of gray, flat-tone paint. To them were fastened various articles to supplement those shown on the sloping sides of the table. In this way the display caught the eyes of many more people.

Various methods of informing the public of the terms of the shop have been used, and most of them are stereotyped forms. One of the illustrations shows a roundabout hint that first gets the attention, then the message given goes straight home. Certainly not a bad one to adopt.

Before an applicant for credit has an opportunity to ask for it, he has digested the meaning of the sign on the manager's desk. The building, being a one-story affair, the meaning is that there is no credit.

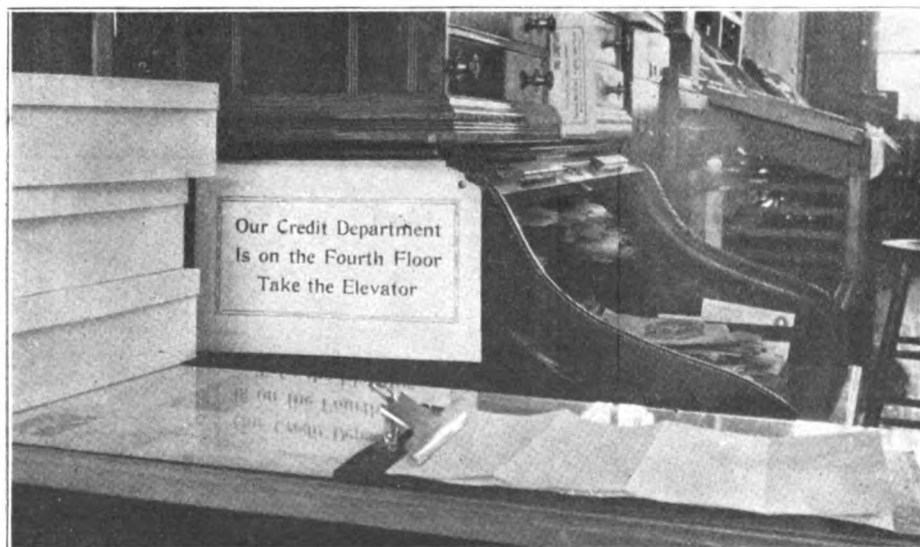
The appointment and accommodations of a restroom always play, in word-of-mouth advertising, for the investment. Travelers in some way pass along many "dos" and "don'ts" to fellow-travelers. Then, too, there is the tendency to consider buying merchandise or service in a shop where convenient restroom facilities are provided.

One place in northern California has its restroom at the front of the store. This, of course, was taking valuable space, but it was also putting a drawing feature where it would attract people. As walls for the room, there were stock shelves.

The ones at the top were shallow, for the smaller stock, while those at the bottom were deeper to accommodate the longer articles. All pigeonholes were uniform at the front, but those at the bottom went farther back. Inside the restroom a seat covered these lower and longer pigeonholes and thus they did not intrude.

Thus the space is made profitable in more ways than one. In the first place, the outside of the room is a series of glass-fronted showcases in which nickel-ware and other articles of plated ware are on view for the women. Women who make use of the lounging room never fail to survey these displays and are tempted many times to inquire about the prices and the uses.

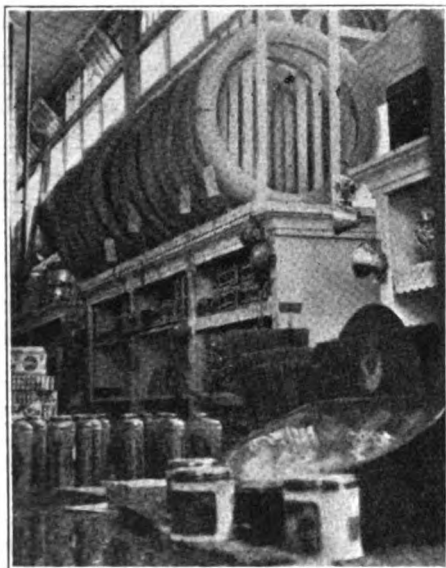
Then the room brings in women while on shopping tours. Outside of the room, along the lower wall, there are stock pig-



"A Hint to the Wise Is Sufficient"—Since Building Is One Story the Meaning Is Obvious.

eonholes for merchandise. These are so long that their ends reach back into the lounging room. That makes it a simple matter to cover them with settees, so that the space is not all waste after all.

On one wall outside are large blueprint



Tires in a Grocery Store! And Sales Were Remarkably Gratifying.

maps of the various routes leading from town. Glass display cases are on the walls inside. In these cases, at all times, are goods that suit the season or the staple needs of motorists. There will be goggles, khaki hats, hot-or-cold bottles, stoves, motor robes and rugs, camera film, lunch outfits and many other things which when seen often mean a sale.

Many shops find that a case of combined lines of candy, tobacco, cigars and cigarettes do well. Some even carry ice chests of bottles of soft drinks. People waiting for service, information, or leg-stretching, form the trade to supplement local patronage.

An Unusual "Free-Air" Station.

The Thompson Tire Co., of Rochester, Minn., has a free-air station that has not only the attention-getting qualities of the unusual, but is particularly suited for several reasons to the ordinary garage locations in small towns with unpaved streets.

One of the members of this company—wearing of an air-hose that was too frequently out of order when needed most and was invariably left trailing on the ground by the various users—set to work to find a way to eliminate this state of affairs, and eventually evolved the unusual standard shown in the illustration.

The pressure pump is in the second story of the building and the air is brought to the outside street level by means of $\frac{3}{4}$ -inch gas pipe. From there to the curb the pipe is laid in the cement, flush with the sidewalk surface.

The standard is of 3-inch gas pipe, on top of which is a U-shaped arm, swung on a swivel joint so that the attached hose and air-pipe may be raised or lowered or

turned in any direction, as convenience may demand.

To get air past this swivel joint and still allow its free turning, a short length of hose is inserted between the air-pipe on the standard and the one on the arm. This arrangement allows the comparatively short length of hose to be used with equal ease on any wheel of a car without changing the car's position.

When not in use, the ball weight causes the air-pipe attached to the U-shaped arm to raise automatically and swing the hose free from the ground, thereby making it safe from damage by being trampled or driven over and also keeping it out of the dust, mud or slop.

All of these qualities are particularly

therefore, timely as well as being practically the only effort of the sort on the part of storage and supply stations to present a solution of the problem which business men using cars faced.

Full advantage was taken of its ten column inches, a comparatively small space, by presenting a well-devised map. This was an attention getter because it was so unlike other advertising matter, and a convincer because so suitable for an appeal to automobile users. Graphics got a message across which the words that could have been placed in that space could hardly have presented.

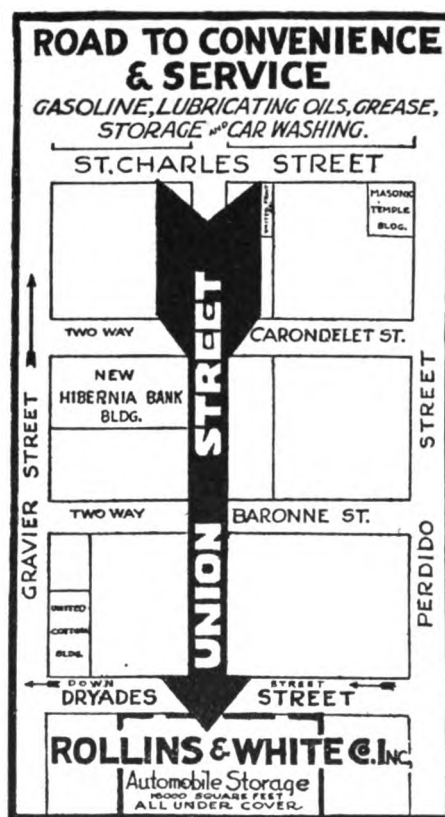
There are tire stations, filling stations, repairshops and automobile dealers, in New Orleans as well as in many other cities, which could make very advantageous use of a map as part, if not all, of a newspaper advertisement.

Novel Method for Selling Spark-Plugs.

W. H. Lefler, of 340 Hall St., Grand Rapids, Mich., recently staged a demonstration of a new spark-plug. This new spark-plug, which affords an inch of firing surface, was shown in action to the patrons of the gasoline service station which Mr. Lefler operates and attracted considerable attention.

As an added inducement for automobile owners to try the new plug, with each purchase of three or five spark-plugs, an extra spark-plug was given free of charge. The offer was limited to the first 20 purchasers.

As a means for introducing the new accessory, this plan seemed very effective and offers an idea which other dealers might utilize to good advantage in creating buying interest and building good sales.



Novel Map Advertisement Makes Effective Appeal to Motorists.

pleasing to the car owner who is also his own chauffeur, and will, therefore, tend to draw his patronage to the shop that provides them.

Map Is Attention Getter.

There is suggestive merit in the maiden advertisement of the Rollins & White Co., Inc., of 331 Dryades Street, New Orleans—both in the appreciation shown by the new concern of the value of newspaper advertising and in the novelty and effectiveness of the copy used.

The company began business at about the same time that new regulations went into effect restricting—and to an extent prohibiting—the parking of cars in the business section, over an area comparable to the Chicago "loop." The announcement was,



Air Hose Convenient But Out of Way and Safe From Damage.

SELLING THE SECOND-HAND CAR.

(Concluded from page 23.)

who will boost for his business and help him to succeed as he should.

It is not the purpose of this article to go into detail in regard to overhauling old cars and putting them into a salable and serviceable condition. Instead it is the intention to point out some of the more important things such as fitting the carbureter, magneto, etc. Therefore, the ease of adaptability of second-hand cars is the first consideration and should be taken into account in making the choice.

In taking up the subject of the carbureter, it is not the writer's intention to give directions for fitting a carbureter, as this is obviously a question that would, almost invariably, be decided on the merits of the case in question. The older type of carbureters were not so scientifically made as those of the present day and, to obtain the best results from an old car, it is very nearly necessary to install a new, up-to-date carbureter in order to get the most out of the old engine. Most of the older types of carbureters have one chief defect—consumption of fuel.

When more fuel is consumed than is necessary, the engine will naturally act more or less sluggish, owing to the heavy charge of fuel being slow to burn. Naturally the expansion of the burning gas will be slow, having less power than the correctly mixed, snappy charge.

There are a number of good carbureters on the market and the danger of failing to select a good carbureter is not so great as not selecting the one of the proper size for the engine. A carbureter that is too small for the particular engine will be just as much of a failure as one that is too large.

Complications in carbureter construction are to be avoided for two reasons: It takes considerable time to fit them properly and it also gives the inexperienced car user an unlimited amount of trouble when adjustments are to be made. Therefore, the more simple the device the better it will be for the user of the second-hand car. Usually, the man who buys the second-hand car does so because he cannot afford a new one.

Naturally, it being very likely his first car and an old one, the best carbureter will be the trade winner for the second-hand car dealer in the long run, for the field of prospects for second-hand cars is large and the dealer who gives the most for the money, and looks after his trade after he has made the sale, will be the fellow to pick the grapes in the second-hand car field.

Every carbureter requires adjusting to its work—by trial or experiment. If the fitting is done by a concern that has had experience in that line, they can be relied upon to arrange the carbureter to the best advantage. In most cases a new and more

efficiently-shaped inlet pipe can be fitted—one that will give the mixture an easier flow to the cylinders.

Particular care will be taken to keep the carbureter as close to the cylinder as possible, so that it can be maintained at a suf-

The Man on the Job?

There is no job in the world but what can be done a little better; so the same job in the hands of two different types of employees becomes two entirely different jobs. The job and the man find a common level. A big man on a small job soon elevates that job into the big-job class. Conversely, a small man on a big job soon causes the job to deteriorate into the small-job class.—George H. Rush, general manager, Morris & Co.'s By-Products Interests.

ficient heat to insure the vaporization of the mixture—a most important factor in economical fuel consumption in these days of heavy grades of gasoline.

Not less important is it to arrange the carbureter so that it is assured of getting an ample "head" of gasoline from the tank when climbing hills. This may mean effecting a compromise between a short inlet pipe and a long one. A point which should be carefully noted is that the type of carbureter selected will actually admit an ample volume of air when required. Some of these devices simply open quite a small aperture that can actually have but little effect.

Another point is that great care must be taken to avoid unintentional air leaks. The extra air valve should, therefore, be so well fitted that it can be kept airtight. Similarly, there must be no air leaks up the inlet-valve guides or at any joints between the carbureter and cylinders. Neglect of these precautions is a prolific source of difficulty in getting good results from a new carbureter.

An effective control for the throttle is very desirable, but this is rarely found on a second-hand car. Therefore, it certainly pays to remove any existing shaky arrangements of rods and loose connections and install an up-to-date wire control, giving fine gradations of throttle adjustments and avoiding backlash.

In fitting magnetos it is always more satisfactory to have a magneto of the latest pattern fitted, preferably a new one, rather than to cheapen the job by installing some second-hand magneto that is liable to give trouble in a short time.

Again, nine times out of ten, the manufacturer will furnish the proper fittings for fitting the new magneto to the old car where, if an old one were used, a poorly-constructed mounting would be the result and the time consumed in making it would amount to more than the difference in cost between the new and the old.

Further, when the old car goes out with a new magneto on it, the dealer has a satisfied feeling that, so far as ignition is concerned, he will not have to make something good in a week or so.

Many old engines have weak compression as the result of leaky valves or piston rings—an easily remedied defect. Engines designed as far back as 1905 have ratios giving somewhere between 60 pounds and 70 pounds per square inch, and the touring car engine of today does not, as a rule, exceed 75 pounds, while some are about 70 pounds.

It is found, when these figures are exceeded, that the disadvantages—such as vibration and a tendency to knock when the load becomes heavy—offset any higher efficiency obtained. There is, however, no reason why an engine, which proves by test with a compression gage to be less than 60 pounds, should not be brought up to at least 65 pounds by grinding the valves and fitting new piston rings.

INNER TUBES AND THEIR REPAIR.

(Concluded from page 21.)

cushion stock 1/64-inch thick and 1/4-inch wide, are placed around the male section of the splice, so that one strip comes at either end of the lap.

The splice should be thoroughly washed with gasoline and three coats of vulcanizing cement applied before this is done. Turn back the female section of the splice and lap the edge of the joint with a strip of gum about 3/4-inch wide. After the splice is rolled well it is ready for the cure.

The cure is accomplished in three hitches, vulcanizing the tube in three different positions with reference to the tube plate. The first hitch is cured between 39 and 35 minutes and the tube taken out and turned over, bringing the opposite side of the splice next to the plate. This time the splice is allowed to remain on the plate only 15 minutes before it is flattened in the opposite way on the plate and allowed to cure that much longer. The time of cure given is only an average. The manufacturer of the gum will recommend the length of cure that is best for his particular product.

After the last hitch is accomplished, the tube is removed from the plate and plunged into water to prevent it from sticking together on the inside. The other end splice is made in a similar manner.

Extreme care should be taken that the tube is neither lengthened or shortened during the splicing. The table shown gives the flat lengths for the various sizes of tubes. The tube should be checked with this table, as lengthening or shortening the tube will encourage stretching or pinching.

If the repairman will use these simple instructions and use caution and cleanliness in his tube repairwork, he should be able to turn out satisfactory repair work on inner tubes.

George K. Culp is Looking for Another Job

We've got hundreds of jobs now. We are working for Culp Plan Stores all over the country. But we still have time to work for a few hundreds more. In these pages we have tried to get a job with you—to show you why your store should be a Culp Plan Store. All we want you to do is to *read* these pages. If you will read them, then think what this means to you, George K. Culp will add another boss to the hundreds he is working for now.

SOMETIMES it is easier to tell how a thing works and what it *is* by telling what it *isn't*. The Culp Plan is *not* a selling plan. We have not a single thing to sell. But we have got a lot of buying to do for Culp Plan dealers.

We can buy for *you* just as low as we are buying for your neighbor in the next city.

You have been doing a lot of thinking and figuring in the last few months, and you have realized that you have not cashed in on your work.

You wise ones have discovered that *you* are paying the railroad fares of the tire salesman and even for the eats and cigars that he hands out to you so freely. That was all in your cost price and some of it pushed down your already narrow margin of profit.

"Cost of selling," they call it in the report that lies on the directors' table at the monthly meeting at the factory.

We started in with tires, because there has been more grief in the tire industry than the other automotive industries. Applied to the manufacturers, it came from bad principles, childish business methods, following the easiest way without knowing where it led. The inevitable result of this chaotic condition on the dealer was to leave him constantly at the mercy of the constantly changing prices and policies of the manufacturer whose tires he sold—in no sense controlling his own business.

The tire dealer has been "carrying the bag" long enough. He deserves more than he has been getting.

His local reputation as an able, honest merchant has not produced the degree of profit which he has a right to expect.

Co-operative buying will wipe out this situation for the dealer and for those manufacturers who have vision enough to see how the Culp Plan will at one stroke cut the cords that bind them.

Co-operative Buying the Solution

Co-operative buying is one of the big

hopes of the tired old business world today.

President Harding, in his message to Congress on Dec. 6, urged the farmers to extend their already notable accomplishments in co-operative selling, with the clear inference that co-operative buying must follow.

We know from what we have already accomplished, that if the Culp Plan were applied broadcast, it would do more toward restoring normal business than any other agency.

The tire dealers, and dealers in a whole lot of other lines, must organize if they expect to survive and to enjoy their legitimate share of the money the consumer spends.

The Culp Plan's job is to unite and strengthen dealers—tire dealers now—dealers in other lines later. Co-operative buying is the only thing that will successfully stop the rush of the mail order house, the unscrupulous methods of the "gyp" and

win back the public, who have been sharing with you dealers, inflated capitalization, excessive selling, and foolish selling expense. Now, suppose enough of you tire dealers could get together, march up to a factory that was making a first-class product, tires and tubes you knew you could stand behind, and say all together, in a loud voice: "We will buy all your product at factory cost, plus 10% for cash."

Would that factory listen, in these days of uncertainty and wobbling policies?

It would. Quite a lot of them have.

It is perfectly plain that if you could buy on that basis, you could take your share of the tires home, and sell them at prices way below your competitors who were not in on the party, and could make a whole lot more profit than they can.

The "Egg" Idea

But it isn't as easy to get your fellow tire dealers together as it is for you and your neighbors at home to "go in together on a case of eggs." (Keep that "egg" idea in



George K. Culp

your mind. It helps to understand the Culp Plan.)

And it is right at *at* point that the Culp Plan goes to work for *you*.

The Culp Plan is buying tires and tubes and batteries and spark plugs and grease and tools—everything you sell—for hundreds of Culp Plan dealers today.

When we say to a factory in whose goods we believe, "We are the purchasing agents for enough dealers to take your whole product; you can make 10% on your factory cost (and we pay cash)—cut out the salesman and the jobber and the advertising, and the warehousing and the traffic department, and all the rest of the clumsy machinery you have thought necessary to make dividends for your stockholders—" when we say *that* speaking for all you dealers, that factory says, "Fine, we'll do it."

That minute that factory becomes *your* factory, as much yours as if it were behind the partition of your store. It is making *your* tires for your Culp Plan Store, with your own Culp Brand.

And that's all there is to the Culp Plan.

On one side is the tire dealer who knows exactly what his consumer wants. On the other side is the manufacturer making honest goods that will sell and stay sold on their merits. And between is George K. Culp, Inc., as the narrow straight through which the commerce of these two great oceans of production and distribution meets.

Now you can see why the Culp Plan is *not* a sales plan. We have nothing to sell except service to thousands of Culp Plan dealers, and enough Culp Plan Associated Manufacturers to supply the demand.

The Culp Plan manufacturer does not sell *us* a penny's worth of his merchandise. He sells direct to *you* and we buy for *you*.

This message is primarily to dealers but, as part of the plan, you will want to know how the manufacturer benefits.

He gets a complete and constant distribution of his full production; a rapid and guaranteed profitable turnover on his working capital; complete and permanent protection against unfair competition; no more long credits or adjustment abuses; a twelve month year instead of a four month year; and a permanent association in a national institution founded on *co-ordination and co-operation without competition*.

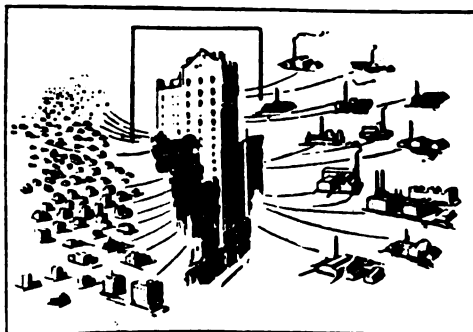
Our factories are making tires and tubes which for years have been favorably and nationally known—as fine merchandise as can be made with rubber and fabrics and beads and air.

We "point with pride" to the list of our manufacturers behind whose products we put our Culp Plan

\$1000 REWARD will be paid to any one who can prove that "CULP PLAN" branded merchandise is not absolutely "firsts," current factory productions, high quality in every respect, and thoroughly guaranteed for workmanship and material.

This tag goes on each unit of Culp Plan Merchandise Brand. The merchandise is standard, first-class—no seconds, no imperfect tires—only the merchandise you want.

You cannot thoroughly appreciate what these sensational prices mean to you, a local dealer, until you have seen a current Culp Plan Merchandise Cost Bulletin. Make application for one on your business letterhead.



The Culp Plan in Action

It is only because we are working for so many "yous" that we can buy on the basis we do. The result is that you get merchandise at a cost that has never even been approached in the history of the industry. Nothing is added to the factory cost plus 10 per cent. This is truly a sensational and revolutionary situation.

One Culp Plan Store in each sales area is the Culp Plan idea. That store will own the big share of the tire and accessory business in its territory. Because of its ability to undersell on the same merchandise that its competitors are offering who are not enjoying the benefits of the Culp Plan.

One of the biggest business builders the Culp Plan Store has is the Culp Plan Co-operative Buyers' Franchise. It links the consumer and commercial accounts firmly into the Culp Plan Chain.

Here's what some of the Culp Plan dealers think:

RUHL TIRE AND BATTERY SHOPS—Belle Plaine, Iowa—

"Our success with the Culp Plan has been almost instantaneous. We have not employed any high salaried salesmen or advertising men, but are merely using the Culp Plan as a leverage. We have made the automobile owners in this community sit up and take notice. The striking feature of the Culp Plan is its simplicity. There is nothing to it. Just a plain open and shut method of buying power."

JOSEPH E. MIRANDON, Paterson, N. J.

"I was so amazed from my first-hand observation that after discussing the proposition with my associates we immediately signed up. We have since received the merchandise and it was all that I expected it to be after my thorough investigation. Our regular trade were glad to purchase merchandise under the new scheme of things. I have found by actual experience that by associating my requirements with other dealers under the Culp Plan it has made a tremendous difference in the prices formerly obtained and those now enjoyed, and I realize that as hundreds of other dealers join our organization, we will be so powerful because of our tremendous merchandise requirements, that nothing under the sun can jar us loose from our strong position."

By this time you are wondering where we "get ours." A glance at the "get acquainted" agreement on the next page will give you an idea. Complete information on request.

Don't fail to read the next page. Fill out the "get acquainted" agreements, send them to us and begin at once to get the benefits of the Co-operative Culp Plan. You are eligible to Culp Plan association under this "get acquainted" agreement if you buy *any* amount of automotive accessories for resale.

These benefits are:

An unlimited supply of merchandise of established quality at manufacturers cost plus.

Pro rata control of supply sources.

Your own merchandise—Culp Plan Brand.

Expert advice in all merchandising problems (exchange of ideas, plans, methods and advertising through George K. Culp, Inc.).

Full control of all your own adjustments on tires—no sending to factory.

Unlimited credit facilities to insure production and guarantee deliveries.

Help in financing.

Smaller stocks—you buy just what you need.

No losses from arbitrary unreasonable price changes.

Greatly increased volume and proportionately increased profits at much lower selling prices.

Independent actual control of your own business.

CULP - PLAN "GET ACQUAINTED" AGREEMENT ORIGINAL "SERIES 3"



This Agreement made the _____ day of _____, 1922 by and between GEORGE K. CULP, Inc., of 56 West 45th St., New York, N. Y., (hereinafter called the Company) and _____ of _____ (hereinafter called the Store). In consideration of the mutual promises and agreements herein contained, WITNESSETH:

This agreement shall make the Store an associate member of the Culp-Plan; it shall become operative on the date first above written and remain in force until terminated in the manner hereinafter provided:

The Company Argees:

- (1) To act as Purchasing Agent for the Store; and to give the Store all the benefits of its factory affiliations;
- (2) To compile and mail to the Store bulletins listing merchandise available for purchase by Culp-Plan Stores;
- (3) The Company guarantees that prices quoted to "Culp-Plan" stores are net quotations as received from "Culp-Plan" associate factories, no profit, commission or other remuneration being added by the Company;
- (4) To adhere to terms and conditions of purchase

This Store Argees:

- as quoted in "Culp-Plan" Bulletins when making "Culp-Plan" purchases;
- (5) To pay to the Company, at time of placing orders, a service commission of $2\frac{1}{2}\%$ of the net amount of order placed;
- (6) To guarantee the Company that the minimum service commission as provided for in paragraph 5 of this agreement will be \$5.00 per month, whether earned by orders placed or not.

It Is Mutually Agreed:

- (7) That any advance or decline in costs affecting the price of "Culp-Plan" merchandise shall not be retroactive;
- (8) That this agreement may be cancelled by either party on fifteen days' notice in writing;
- (9) This agreement expires on May 31, 1922, unless previously cancelled by either party.

GEORGE K. CULP, Inc.

.....By _____

By _____

President.

.....
Subject to refusal should a regular Culp-Plan store now be operating in the city or town above mentioned.

EXPLAINING THE CULP-PLAN "GET ACQUAINTED" AGREEMENT SHOWN ABOVE

Read over carefully the above "Get Acquainted" agreement. Nothing could be fairer, simpler or less binding to you. It simply means that for a maximum period, some four months, you can order from the Culp-Plan associated factories on exactly the same terms as the regular Culp-Plan stores and derive all the privileges of such association. You can order as little or as much as you please and at any time you desire to end the agreement during the four months' interval you can do so on fifteen days' notice in writing. Absolutely the only payment to us on this proposition is a service commission of $2\frac{1}{2}\%$ of the net amount of orders placed, and when you see one of Culp-Plan store cost bulletins you will readily agree that this is the biggest opportunity that you have ever had. We feel that if you are serious in your desire to give the Culp-Plan a real test, you will order at least enough to bring the service commission to \$5.00 monthly, so we indicate in the agreement that the minimum monthly service commission will be this amount.

It is just as if we passed out to each member of the trade a sample package of the Culp-Plan so that each one could decide for himself by actually "feeling the goods" whether or not all we have said in print is substantiated by the merchandise.

Fill in the above agreement (on a typewriter, if possible), tear out and mail to us immediately. If your "Get Acquainted" agreement is accepted by us, a duplicate copy of the same will be returned to you for your files.

GEORGE K. CULP, Inc.

56 West 45th Street

New York City

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Legal Rulings of Interest to Garagemen

Garage Keeper's Lien Act of 1915 Not Binding in Case of Car Sold After Owner Has Taken It From the Shop—Garage in Strictly Residential Section Motor Truck is Ruled as Not Being in "Operation" Because Unregistered

By R. R. Rossing

Loss of Garage Keeper's Lien After Car Is Taken from Garage.

Where a garage keeper or repairman permits an automobile, to or for which he has furnished service or supplies at his garage or shop without receiving payment therefor, to be taken away by the owner, who subsequently sells and delivers it to an innocent purchaser for value without notice, the lien created by the New Jersey garage keeper's lien act of 1915 (P. L. 556) for such service or supplies does not bind such automobile in the hands of such purchaser. *Crucible Steel Co. v. Polack Tyre & Rubber Co.*, 92 N. J. Law, 221, 104 Atl. 324, distinguished.—*Lanterman v. Luby*. Court of Errors and Appeals of New Jersey. 114 Atlantic 325.

Injury to Automobile Owner While in Garage.

Whether an automobile owner, storing his car on the third floor of defendant's garage, was guilty of contributory negligence in injecting his head through an opening between the upper and lower doors of the elevator to shout down the shaft, after efforts, repeatedly exerted by means of ringing the bell, to have the elevator brought to his floor had proved futile, the doors closing and injuring him by some action of the elevator on the lower floor, after having remained stationary for 15 minutes, was held a matter for the jury to decide.—*Teich v. Seidman's Garage*. Supreme Court of New York. 188 N. Y. Supp. 488.

Use of Truck Waives the Right to Rescind Sale.

Plaintiff buyer of an automobile truck, who, on discovering that the truck was a three-fourths ton instead of a one-ton truck, which he had asked for, expressed willingness to return the truck to defendant seller, but continued to use it in his business for 23 days after discovery of the fraud, did not effect a rescission, having waived his right to rescind by using the truck in his business after discovery of the fraud.

Where there has been no rescission of a conditional contract of sale, and the buyer is not entitled to rescind, the money paid by him on account of the purchase price belongs to the seller under the contract, and cannot be recovered by the buyer as in an action for money had and received, for the vendee's rights under a

contract of sale may be forfeited for his breach of a contract condition.—*Hogan v. Anthony*. District Court of Appeal, Cal. 198 Pacific 47.

Garage in Strictly Residential District Enjoined.

A garage is not a nuisance per se, but may become one when established and operated in a strictly residential section.

The construction and operation of a garage in a section of the city in which such a business has never been carried on, and which has been used exclusively for residential purposes, where the establishment and operation of the garage will seriously injure the health of the residents, impair the value of their properties, increase the fire risk of such properties, and render the vicinity undesirable as a residential district, will be enjoined.—*Lewis v. Berney*. Court of Civil Appeals of Texas. 230 Southwestern 246.

Duty to Install Oil Separator in Leased Garage.

An oil separator was a "structural addition" to a leased garage, within the provision of the lease that the tenant should make such repairs and alterations as should be required by any of the departments or bureaus of the city of New York, except that it should not be required to make structural additions.

The owner of a garage, who during erection agreed with the city to erect an oil separator, if required under ordinances by the fire department, is liable to the tenant of the garage for the cost of installing such separator, after having refused to do so when the installation was required by the fire department.—*New York Motor Truck Sales Corp. v. Corse*. Supreme Court of New York. 189 N. Y. Supp. 94.

Liability for Injury Resulting from Truck Left in Gear.

Evidence that it was the custom and duty of the general manager and superintendent of a garage and transfer business to see that trucks were left in neutral, and not in gear, but that he left a truck in gear, and that an employee, whose duty it was to crank the truck, was injured by the starting of the truck, and that he looked before cranking it to see if it was in neutral or in gear, but that it was dark, and it appeared to be in neutral, that he had

very little experience, and that an expert could not always tell by looking, if believed, was made a cause of action against the employer for the injuries.—*Ensley Transfer & Supply Co. v. Alexander*. Supreme Court of Alabama. 89 Southern 42.

Unregistered Motor Truck in Tow, Not in "Operation."

Plaintiffs' motor truck, which, after becoming disabled, had been towed to a garage, and which, in course of being pushed into the garage, when the pushing truck stopped for a moment and backed away to get into another position was struck by defendant's street car, was not in "operation" within Pub. Acts 1919, c. 233, article 44, which provided no recovery shall be had in the courts by an owner of a motor vehicle not legally registered in accordance with sections 8 to 12, for injury to persons or property received by reason of the operation of such motor vehicle on a public highway.—*Dewhirst v. Connecticut Co.* Supreme Court of Errors of Connecticut. 114 Atlantic 100.

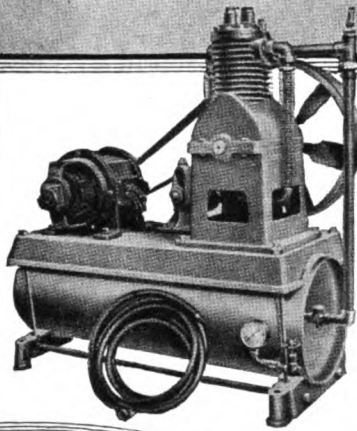
Duty of Garage Keeper Letting Automobiles for Hire.

A garage keeper who lets automobiles for hire owes a duty to the public to the extent that he is bound to use ordinary care to see that the car he lets to be operated on the public highways has its steering gear in a reasonably safe condition, and one injured through his neglect so to do has a cause of action against him.—*Collette v. Page*. Supreme Court of Rhode Island. 114 Atlantic 136.

Sales Company Not Liable for Negligence of Demonstrator.

In an action against a corporation selling automobiles, for injuries to a bicyclist struck by an automobile driven by the company's employee demonstrating the car, which had been left with the company to be sold, the court held that defendant was entitled to a nonsuit on the ground that the evidence was insufficient to connect defendant either with the ownership or operation of the automobile.

The only evidence offered clearly showed that the corporation's employee at the time of the accident was working on his own time and beyond the scope of his employment.—*Patton v. Woodward Co.* District Court of Appeal, California. 197 Pacific 368.



CURTIS *Single and Two-Stage* AIR COMPRESSORS

Curtis Single-Stage Compressors—the most popular everywhere. Have controlled splash oiling system—runs ten to fifteen times as long on same amount of oil. Fan flywheel—helps in keeping cylinder cool. Hand unloader—prevents blowing fuses and jumping belt. Head removable without loosening pipe connection. Also many other exclusive features. Several styles and sizes.

Curtis Two-Stage Compressors have same features that established our single-stage so strongly and in addition have all possible advantage of two-stage compression. Exclusive Aeroplane type COPPER intercooler with thin radiating fins rigidly attached assures fullest advantage of two-stage compression. Several styles—two capacities.

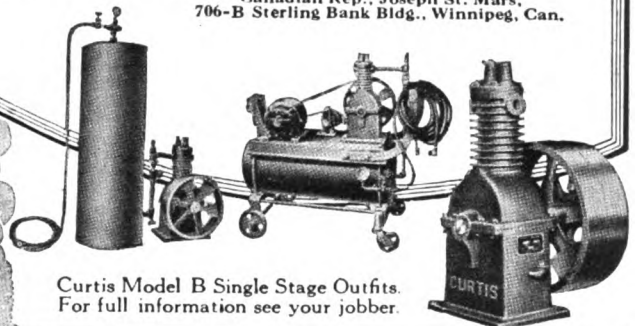
FREE
CURTIS AIR
FREE FROM OIL

This Curtis Sign—14x20 inches—baked enamel on heavy steel. Furnished at small cost to users of Curtis Garage Air Compressors.

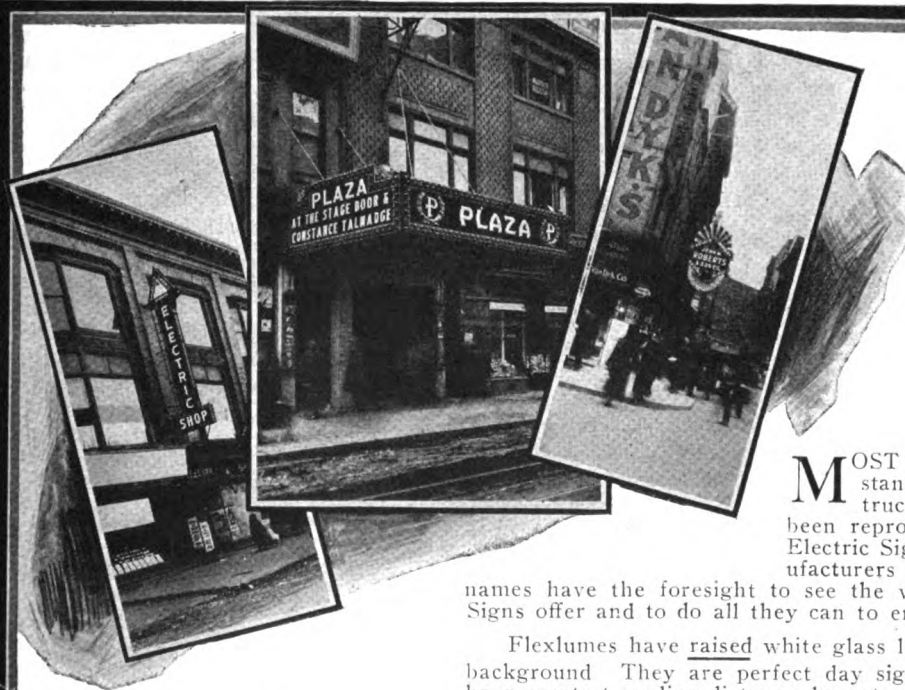
Curtis Pneumatic Machinery Co.
1515 Kienlen Ave. St. Louis, Mo.

Branch Office:
530-U Hudson Terminal, New York City

Canadian Rep., Joseph St. Mars,
706-B Sterling Bank Bldg., Winnipeg, Can.



Curtis Model B Single Stage Outfits.
For full information see your jobber.



Flexlume Signs

Display Most of
the Best Known
Trademarks

MOST of the best known trademarks standing for quality in pleasure cars, trucks, tires and accessories have been reproduced in the form of Flexlume Electric Signs. The reason is plain. Manufacturers who are able to build up great names have the foresight to see the wonderful possibilities Flexlume Signs offer and to do all they can to encourage their use.

Flexlumes have raised white glass letters standing out from a dark background. They are perfect day signs as well as night signs—they have greatest reading distance, lowest upkeep cost, most artistic designs.

We shall be glad to send you booklets showing Flexlumes designed for the automobile trade or a sketch showing a sign for your particular business.

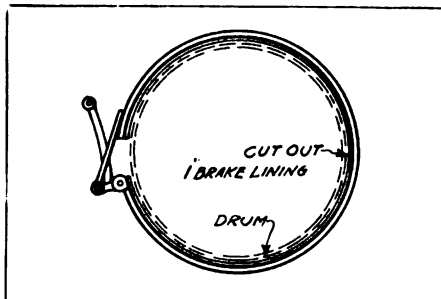
FLEXLUME CORPORATION
25 KAIL STREET BUFFALO, N. Y.

FLEXLUMES—ELECTRIC SIGNS MADE ONLY BY THE FLEXLUME CORPORATION

Practical Hints for Shop Mechanics

Curing Squeaky Brakes.

This method will work on cars equipped with contracting brakes. At a point diametrically opposed to the pull levers, drive in a screwdriver between the brake-band



Makes the Brakes Take Hold Better.

and the drum. This will slightly raise the brake-lining at this point.

Then, with a saw blade, remove a section of the lining about an inch long. This will leave a small gap in the lining. Now take the car out and test it. The brakes will take hold much better and the squeak is eliminated.—R. W. T., Mo.

* * *

Cutting Small Gaskets.

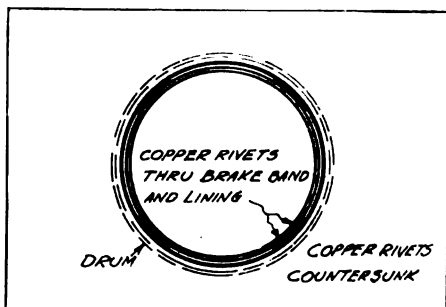
To cut small gaskets put the material between two boards and screw in a vise. Use a carpenter's brace and bit of the proper size as this makes a nice clean job.—I. D. B., Iowa.

* * *

Making Brake Bands Work.

I am sending you a description of an idea which I worked out so that the inside brake bands on my car would work properly.

The inside brake bands of the car became worn down to a certain place, so that no matter how far I adjusted the rods they would not take hold when the hand lever was pulled all the way back. I found that



Good When Bands Are Worn.

they had worn unevenly, and I had them taken off and examined.

Then, I had holes bored in several places in the brake bands and copper rivets inserted to hold small strips of brake lining, which were fastened to the outside surface

of the inside brake band. The brake lining was so placed that it would take hold all the way around, and I found that when it was replaced on the car it worked first-rate.

This was simply an idea which came into my head one day when I was riding along, tried to stop my car with the hand-brake, and found it at fault. Many other cars are the same way. An accident is likely if they are not given the attention they need.—C. H. T., Pa.

* * *

Making a Non-Blowout Patch.

This being the 13th and my lucky day, I thought perhaps a little kink which I use very often would find its way into your paper under the head of practical hints.

I have found this device very good when making long trips and also as an emergency repair for one of my customers. The device is a non-blowout patch, for large blowouts, that will hold practically any blowout.

I take an old casing—the same size as the casing which I wish to repair—cut out a patch that will extend about five inches on each side of the hole in the casing to be repaired, and remove the bead from both sides. Then take a piece of alligator belt lacing and put this on the patch the same as one would in lacing a belt. I do not have this extend to the end of the patch, as I want the patch to expand where the casing to be repaired is solid enough to withstand the strain and this will not have a tendency to chafe the tube.

When I applied the lacing, I put the tube inside the patch and put a chafing strip over the metal parts of the lacing and then put the tube into the casing together with the patch, being sure to put the laced portion directly over the blowout.—M. R. F., Mich.

* * *

Easy Method for Drawing Gasolene.

The following is a very satisfactory way of drawing gasolene from a passing car which may not be equipped with convenient drain cocks for drawing gasolene easily.

Procure a piece of hose or tubing about 1/4-inch or 3/8-inch in diameter, and 18 inches to 24 inches in length. Pump hose is satisfactory for this purpose.

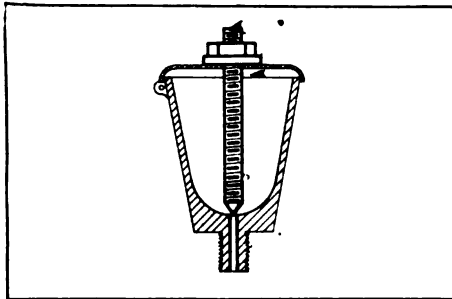
Insert one end into the gasolene and hold the other end slightly lower than the level of the gasolene in the tank and use it as a siphon.

The method I use to start the siphon for gasolene from one receptacle to another is to draw a string or wire—with a swab or plunger of the proper size fastened to one end—through the hose or tube, thus sucking the gasolene through the tube and causing it to flow. This method can be used on the road.—R. C. S., Tenn.

Remodeled Oil Cups.

A number of plain oil cups were changed to the self-feeding type as follows:

The hinged cap of the oil cup was tapped for a 5/16-inch, cone-pointed set



Feeds One Drop in Five Minutes.

screw, and a locknut applied to prevent the screw from jarring loose. This screw acted as a needle valve, seating on the edge of the small hole in the bottom.

A hole for filling the cup was drilled through the cover and the latter was then sweated fast. A feed as slow as one drop in five minutes is thus obtained, or it may be speeded up to suit.—C. H. T., Pa.

* * *

Saves Hunting Cotter-Pin Hole.

Before replacing the burr which holds the rear wheel on the axle, make a pencil mark on the wheel or hub, showing where the cotter-pin hole in the axle is, and you won't have to waste much time hunting for the cotter-pin hole after the burr is tightened.—O. H. S., Minn.

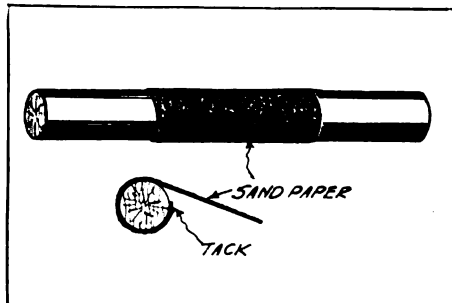
* * *

For Fitting Bearings.

We are sending you a shop hint, that we use in fitting bearings.

We take a round stick, about the size of the shaft, and wrap two layers of sandpaper around the center, as per diagram.

The small nail is to hold the paper from slipping. The stick is just long enough to



Gives Correct Fit and Smoother Bearing.

make a handle on each end. This gives you a chance to remove a small amount of the metal without spoiling your bearing, and so makes a correct fit and a smoother bearing than a bearing scraper.—B. Auto & Mfg. Co., Minn.

B.G. SPARK PLUG

*That
Hot-Spot
Disk*

saves power, gas, money
and trouble.

A Shot-gun Blast of Flame!

On the compression stroke, the monel metal Hot Spot Disk (D) breaks up the globules of oil and gasoline and conditions them for perfect combustion. Compression by the piston forces the finely vaporized mixture into the firing chamber (F) inside the plug.

Then comes the explosion, and a *shot-gun blast of flame* is projected from the plug into the cylinder, *compelling complete ignition* and *effecting maximum power*.

The B. G. Plug has other big advantages—

The B. G. *cleans itself*—the shot-gun flash of flame scours the sparking points at every explosion, insuring a fat, full spark.

The B. G. is *guaranteed* against shorting from carbon and fouling by oil.

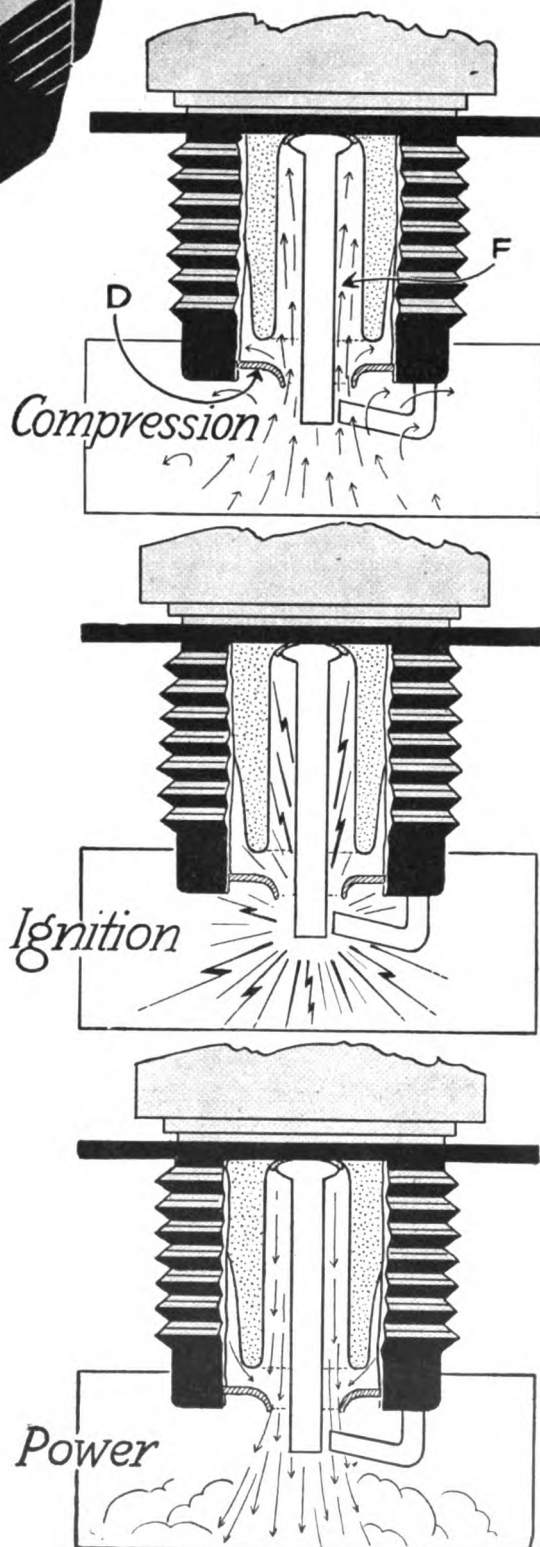
The B. G. *saves gas* by permitting the motor to function on a much leaner mixture.

The B. G. Plug is sold on a *money back basis*. Should any plug fail to live up to our guarantee within 30 days, the price will be refunded.

The B. G. sells itself. Good profit, attractive discounts. If your jobber cannot supply you, send your initial order to us, with jobber's name and address.

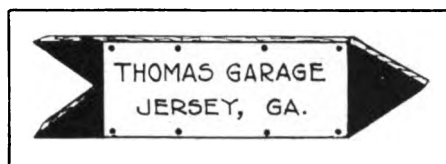
THE B.G. CORPORATION

35D Gold Street, New York



Unique Advertising Sign.

Instead of nailing the sheet metal fence and barn sign put out by the B. F. Goodrich Rubber Co. onto a fence or barn, as



Home-Made Sign Points Way While Doing Some Good Advertising.

is the usual custom, I submit the following:

Take a board, 1 inch thick by 12 inches wide, and saw off long enough to allow a projection of six inches on each end of the sign. Then saw the board into the shape shown in the illustration.

The ends should be painted red. This adds greatly to the value of the sign, as it points the way while it advertises.—J. M. T., Ga.

* * *

Placing Drive-Shaft Sleeve.

When overhauling the rear end of Ford cars, it is sometimes the case that the drive-shaft has to have a new sleeve placed on it because of the old one having burst or worn out.

In order to more easily determine the correct position in which to set the new sleeve, so it will drive down on the shaft in its proper place in line with the pinion key, set the sleeve as when ready to drive it downward.

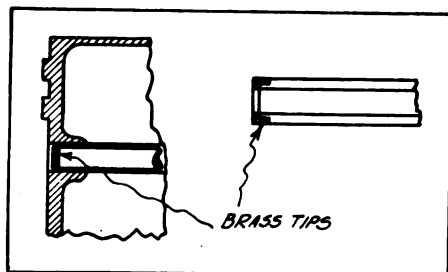
If the light is placed so it will shine on the shaft, it will be easy to get it to shine so that it will be exactly in line with the center of the keyway and thus the center of the place to which it corresponds in the sleeve when down on the shaft.—G. F. H., N. C.

* * *

Brass Tips on Piston Pins.

Brass tips on piston pins prevent damage to the cylinders if piston pins come loose.

Such equipment is very useful on an engine which is subject to such trouble, due to defective design and is salable as well.



Prevents Damage to Cylinders from Loosened Piston Pins.

One repairman has made up and sold several sets for a certain car.—S. E. G., Iowa.

* * *

Method for Filing Piston Rings.

Many steps and much time can be saved in filing piston rings, by sticking the pointed

end of the file in a cap-screw hole in the motor block and holding the opposite end firmly against the chest.

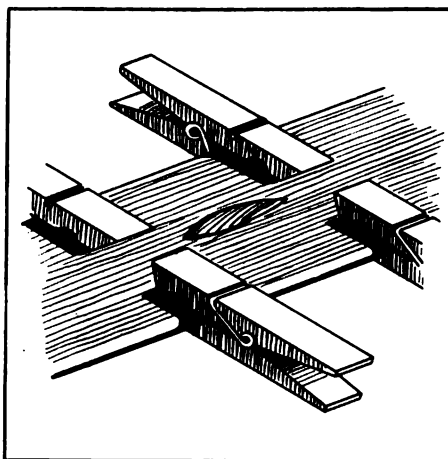
Dress down the ring by holding firmly in both hands and moving it back and forth, with the file between the ends. This is, of course, when the motor is removed and is lying side down on the bench or motor stand. Many trips can be saved in this manner.

This method of filing is preferable to the general practice of clamping the rings in the vise and dressing down. It saves time, makes a more accurate joint and there is less chance of breaking the rings.—G. F. S., Ill.

* * *

Holding Tube While Patching.

I use four patent spring clothes pins, as shown in the accompanying illustration, and clamp them on the inner tube as shown



Clothes Pins Hold Tube Flat While You Are Repairing Punctures.

to hold it flat while repairing punctures. This is a simple and convenient method that will be found helpful.—P. B., Pa.

* * *

New Battery Fails—Too Strong.

Recently a mechanic removed an old rental battery and replaced it with a new fully-charged battery, but the new battery would not turn the engine over.

The old battery was replaced and worked, and the new one was tested and proved all right on another car. It was found that the brushes on the starting motor were poorly soldered, and the new battery sent so much current through them that the connection heated. The resistance became so high that it could not turn the motor over.

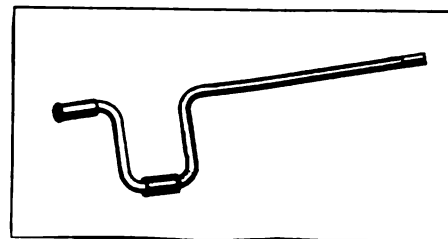
When the connections were repaired, the new battery worked nicely.—S. E. G., Iowa.

* * *

To Make Speed Wrenches.

Take a piece of $\frac{1}{2}$ -inch, cold-rolled steel, 24 inches long. Bend at right angles, $3\frac{1}{2}$ inches from the end, and rivet a wrist-pin onto this end.

Make the other bends according to drawing and square the other end to fit the Mossberg sockets. Sockets may also be made from wrist-pins to use with this.



Suggestion for a Handy Speed Wrench.

You will find this simple home-made device useful and convenient many times.—A. C. O., Neb.

* * *

Mending the Engine Leak.

For cracks in an engine, or a cast of any kind which holds water or even compression, put one pound of blue vitriol to five gallons of water and let dissolve. Pour into the engine or radiator and let stand from 24 to 36 hours. Drain out, let the motor stand a few hours or run the motor without water a few seconds, and the crack will not leak compression or water the solution acting as an effective mend.

This is also very good for cleaning out the radiator once a year.—J. B. G., Neb.

* * *

Removing Carbon.

In removing carbon from a Ford motor or any motor having a detachable cylinder head, it often gets into the bolt holes and causes no end of trouble.

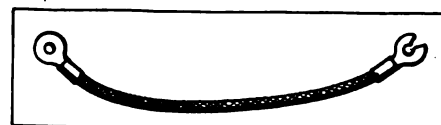
To prevent this annoyance, simply fill a small oil can with water and, before starting to scrape the carbon, fill each hole nearly full with the water. It will then be seen that any carbon which otherwise would have dropped into the bolt hole will be found floating on top of the water.

Then, after the process of scraping is completed, a slight blow with the mouth onto each hole will spread the carbon on the cylinder top where it can easily be wiped off.—W. B. O'B., N. H.

* * *

Removing Spark-Plug Terminals.

Keep a small pair of tinner's shears at hand and, when necessary to remove the cables from spark-plugs for cleaning or



Useful When Removing Spark-Plug Cables for Cleaning.

overhauling, snip a slot in the terminal as shown.

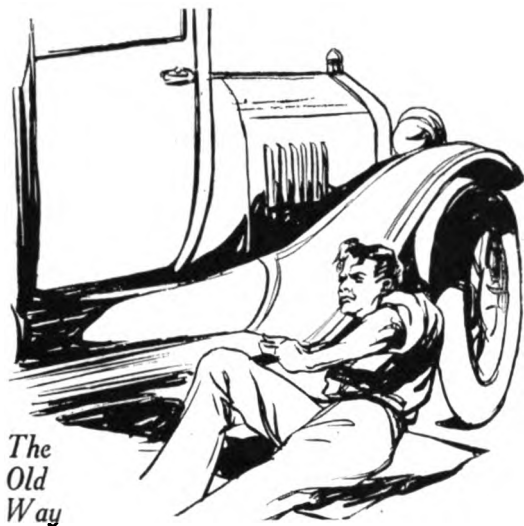
The next time it will not be necessary to remove the nut from the spark-plugs when you want to clean or overhaul them.—R. W. T., Mo.

No More Crawling Under Your FORD

Oil Adjusted From Driver's Seat

NO DIRT or GREASE

NO TROUBLE



*The
Old
Way*

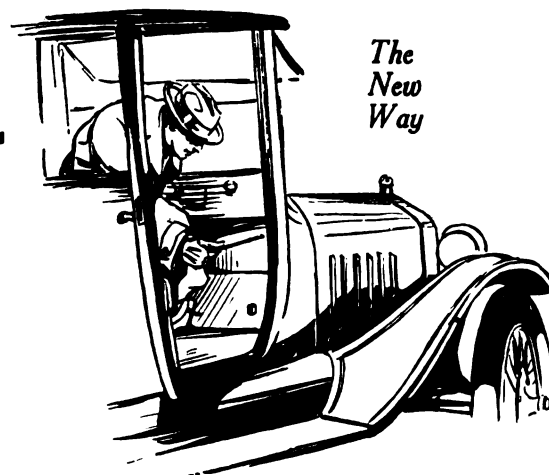
ELIMINATE THIS

FORD DEALERS everywhere greet **Schaefer Oil Gauge** with great enthusiasm. They appreciate its acceptance by the **Ford owner** as his best assurance against **Burnt Out Bearings**; and as a reducer of expenses, a sure eliminator of trouble and a good preserver of clean clothes. It has many appeals for the Ford owner and these are but a few of the numerous reasons why **Schaefer Oil Gauges** sell themselves.

ALL OIL TROUBLE ELIMINATED

The **Ford owner** usually guesses at his oil supply. He just hates to creep under his car with a pair of pliers, twist open the two pet cocks to find out how the oil supply stands. He relies upon guess work and guess work is usually wrong. The result is burnt out bearings and cylinders full of carbon. Show him **Schaefer's Oil Gauge** which will eliminate all troubles; show him how simple it will be to unscrew the rod from the toe board, lift it up

With
**Schaefer
OIL
WATCH**



*The
New
Way*

FOOL-PROOF and HANDY

and see at a glance whether his oil is at the proper level or not. No stepping out of the car. No creeping under it. No dirty work and no more oil trouble—the full facts in a few seconds.

EASILY INSTALLED

Installing the **Schaefer** is so simple that he can do it himself. Simply attach it to the crank case in place of the lower pet cock, bring it up through the toe board and everything is set. No further trouble with oil supplies will be experienced.

ABSOLUTELY ACCURATE

There is no complicated arrangement which can get out of order and mislead him. What is read on the rod is the **exact** amount of oil in the crank case. The **Schaefer Oil Gauge** cannot lie because there is absolutely nothing which can get out of order.

DEALERS: You will want to carry **Schaefer Oil Gauges** in stock so that you will have them when asked for. They retail for only \$2.50. (Write for particulars about our attractive dealer proposition.)

Mail This Coupon Today

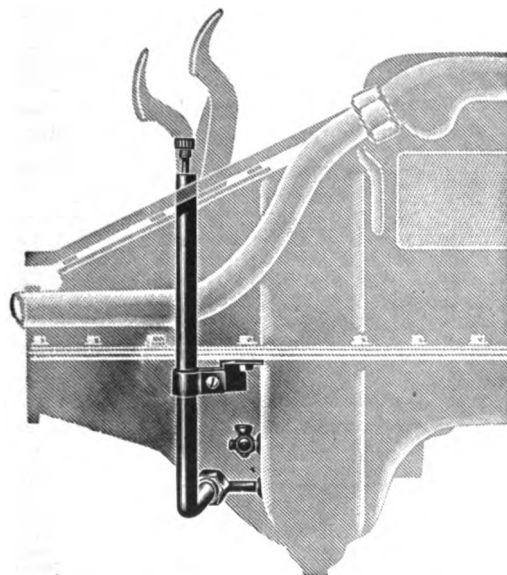
Philip Schaefer & Company
20 E. Jackson Blvd., Chicago, Ill.

Please send me your dealer proposition:

Name

Address

Jobber



Readers' Questions and Answers

That Elusive Rattle.

We have a car which has a rattle, the cause of which we are unable to locate. Can you suggest what may be causing this trouble?—L. B. N., Wisc.

Have you inspected the shackles and shackle bolts? If there is any play or looseness between the spring end and the shackle, this may be the cause of the difficulty.

We would suggest that you see whether the spring belt needs tightening. Shims may be placed between the spring end and the shackle.

Attention should also be given to the lubrication of the shackle bolts.

Be careful to keep the shackles clean of mud, as gritty substances may get into the working parts and cause wear.

* * *

Starting Motor Wrong.

As I am a reader of your valuable paper and am a garage mechanic, the questions and answers are very interesting to me. Now, I have some questions to ask. At the present time, I have a Velie car, model 28, equipped with Remy electrical system, the starting motor of which is wrong.

This starter has been in the hands of the factory, also the General Motors service people, of Indianapolis, and they claim that it is all right. But I do not agree.

Idling, this starter should take 40 amperes, and under load 300 amperes.

But under my tests, this starter consumes 500 amperes under load—that is, mounted on engine—and will completely discharge a battery in three days. I have had five different batteries in this car, so I know that the battery is not at fault.

I have wired the starter independently of all other circuits, cutting out the starter switch entirely. I have examined and cleaned and tightened the ground connection.

The ground on this system is the (+) positive side. I have fitted new brushes to this starter, examined and tested all internal connections, and tested both armature and field windings, and everything seems O. K., using lamp test 110-volts, alternating current. According to my voltmeter tests, there is a partial open circuit in the fields.

In fitting these brushes, there seems to be considerable play between the sides of the brush holders and the brushes.

The generator used on the model 28 Velie car is a Remy 161C or 161D, the starter is a Remy 180A and the positive side is grounded.

We find that, on a pull of 10 to 14 foot pounds, which would be required for cranking, this motor should draw from 460 to 600 amperes. You state that the actual current is 500 amperes, so we believe that the trouble is not in the motor. This is supported by the fact that it is practically impossible to discharge a battery by high

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your business, the more you will know—and the more you know, the more money you will make.

Whether you are a dealer, a salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

current consumption in the starting motor, provided there are no shorts, grounds or other faults, and provided that the starter is not used so often in proportion to the running time that there is insufficient charge.

The maximum output should be 14.5 amperes and 7 amperes should be delivered at from 780 to 850 r. p. m. You should now test the generator output and if it does not reach the proper maximum, the usual tests of brushes, commutator condition, etc., should be made.

If the output is still too low, the instructions for regulating it given by the manufacturers should be followed. With the proper output secured, the cut-out closing and opening should be tested. The closing should take place with 6.4 to 6.6 volts at 600 to 700 r. p. m. and the opening should take place with not to exceed 1 ampere discharge.

Unless the cut-out performance meets these requirements, which it probably does not, adjustments should be made. This would include checking the gaps, etc.

Now, under normal operating conditions, with the starter operating as stated in your letter, with the generator giving its rated

output and with the cut-out closing and opening properly, there will be no trouble keeping the battery charged unless there are overloads on the battery such as shorts, grounds and too many accessories.

* * *

Grinding in Ring and Pinion Gears.

I have one of the old model Stevens cars, and have had considerable trouble with the ring and pinion gears making a grinding or "howling" noise.

I have adjusted these gears in almost every way and also had the adjustment made by men who were supposed to be experts along this line. Still the noise continued and nearly every year I was compelled to replace the ring and pinion gears in this car, as they showed excessive wear and sometimes some of the teeth of the ring gear were chipped or broken.

Could you advise me, through the columns of the AMERICAN GARAGE & AUTO DEALER, what would be likely to cause this trouble?—G. E. P., N. Y.

The trouble you are having with the ring and pinion gears of the Stevens car seems to be of rather an unusual nature, and about the only suggestion we could make, inasmuch as the adjustment was made as you have stated, is that at some time the differential assembly supports or carriers have been strained or otherwise thrown out of alignment. Or, for some reason, the pinion shaft carrying the pinion gear is not aligning properly with the ring gear, causing the grinding or "howling" noise of which you speak.

We suggest that the axle housing be dismantled and tested to see if the housing or differential assembly supports are sprung or otherwise damaged.

It would also be advisable to examine the pinion shaft to make sure it is not sprung.

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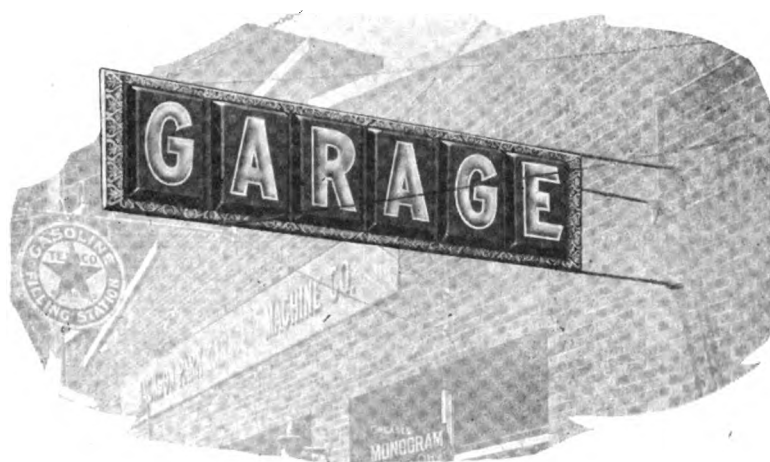
Garageman's Lien Forfeited.

We would appreciate it if you would print an answer to the following question in your next issue.

We are holding a car for a repair, tire and storage bill. We have allowed this car to go out after it was repaired as the customer was storing the car here by the month in this garage.

The owner has sold the car with a clear title. Now, are we entitled to hold the car until we receive payment of our bill or do we have to deliver the car to the new owner?—W. F. B., Mass.

Unless the statutes in Massachusetts specifically overturn the general rule of law—and it is unlikely that they do—you do not have a right to hold the car now in storage with you for repair charges. You have no lien rights against the car at the present time, such right having been lost when you allowed the car to go out of your possession before the work was paid for.

**FEDERAL
ELECTRIC SIGN**

Catch the Eye of Every Passerby

Don't let them pass your place of business unnoticed.

Make your name and place of business stand out stronger in the minds of prospects than your competitors—advertise in front of your store

in such a dominant, forceful manner that no one can possibly miss you—and everyone will remember you.

Erect a sparkling Federal Electric Sign—its drawing power is remarkable. Get business—now.

12 MONTHS TO PAY

A small payment brings you this wonderful new sign—it pays for itself while you pay for the sign—beautiful blue and white porcelain enameled background—the big letters are of snow white silveray glass, smooth and very easily read from a great distance

in each direction. Costs only a few cents a day for electricity.

Employ this unusual business booster without delay. You need it now. Send coupon for full information and prices as well as free sketch showing how your Federal Electric Sign will look. No obligation—do it NOW.

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 So. State St., Chicago, Ill.

A. G. & A. D.-3

Please send me full information, price and free sketch of Federal Electric Porcelain-Silveray Sign for my business. Explain your Easy Payment Plan.

Name City..... State.....

Street and No..... Business

Store Frontage No. of Floors.....

Federal Electric Signs are the cause of a busy street—not the result

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Make Your Store the Most Talked of in Your Town

The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.

It is **not** given away.

It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

There is absolutely no other way by which you can secure this sign. It and every one of the epigrams are copyrighted. There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

Write today for full particulars. Learn all about the Big En-ar-co Boy and Slate Sign, the epigram service, and the other advertising helps we give our dealers. Be the first in your community to get started. Use the Coupon. Use it **Now!**

THE NATIONAL REFINING COMPANY

National Headquarters, M-731 National Bldg., Cleveland, Ohio
4 Modern Refineries : 93 Branches

THE NATIONAL REFINING COMPANY,
M-731 National Building, Cleveland, Ohio

Without obligation to me please send full detailed information regarding the En-ar-co "Boy and Slate" and Epigram Service, and other advertising helps.

Name.....

Address.....

City..... State.....

I now sell..... Oil.....



Accessories—Dealers' Key to Profits

Do You Want to Cut Your Sales Cost? Then Read This.

'Way back in the good old days before the war brought its many vexing problems and before worrying over ways and means to beat old "H. C. L." at his own game became our daily occupation, George K. Culp was busily engaged in acquiring and storing up a broad and accurate knowledge of every phase of the tire industry and, later, of the rubber industry.

Mr. Culp has an established reputation as a tire expert, plus the ability to see things clearly and to act with determination. A survey of the present status of the tire industry convinced him that its weakest point lay in the relation between the manufacturers and the distributors—that production possibilities are not lacking but are not being properly utilized.

Recognizing this basic weakness, Mr. Culp brought together an organization of tire experts—under the name of George K. Culp, Inc.—and devised a simple and yet most effective plan for the creation of an organization that would consolidate production and distribution, eliminate waste, reduce high costs and bring about an increased production with a steadily sustained quality.

Concentrated force is the idea upon which this plan is founded. For instance, factories which produce tires are consolidated on one hand, while retailers are consolidated on the other. The concentrated purchasing power of the latter enables them to buy the entire output of the former on the basis of cost plus 10 per cent, thus wiping out the enormous selling costs which, in many cases, amount to more than the manufacturing cost of the article.

"It is the high selling cost of most articles that keeps up the high cost of living," says Mr. Culp. "This is true not only of tires but of hats, shoes and almost everything else. The sales exchange is often as great as the direct labor and material costs. Obviously, it is almost impossible to lower the costs of labor and material. There will be some wage cuts and some materials will be cheaper but they will not bring down the cost of living to any appreciable extent

"Manufacturing profits cannot be reduced and retailers cannot reduce their profits—and remain in business. So the big cut must come in the sales costs. This can be brought about by combining the purchasing power of groups of retailers so that the entire output of factories can be obtained on a cost plus 10 per cent basis.

"There are very few manufacturers who are unwilling to sell their output on that basis and with the proper method of distribution, that practically eliminates the

sales costs, for the lower price insures customers which, of course, are necessary to make the plan a success.

"Naturally the man who brings the two groups into such agreement must be allowed a profit, but that profit comes out of the greatly increased dealer's profit. I have worked it out on a strictly cash basis, the retailer paying cash on delivery for the articles, and thus enabling the manufacturers to get cash for their product. Of course, that is one of the reasons why manufacturers will sell their output on a cost plus 10 per cent basis.

"I believe that this very simple plan will do more to bring about normalcy as far as prices are concerned than anything that has been suggested. It is simply a variation of the old co-operative idea. The big mail order houses are able to undersell the small retailer because they are able to buy in enormous quantities.

"When you buy the entire output of a factory, you naturally get a much cheaper price. And when you offer necessary articles at 40 to 60 per cent less than the public has been accustomed to pay for them, you have wiped out the bulk of the sales costs, for you have all the customers you can supply.

"Any number of men have attempted to



Precision Switch Is Cylindrical Type and Is Dependable and Durable.

bring retailers and manufacturers together to reduce their overhead but my plan is more effective in eliminating the sales costs than any I have encountered, for the retailer doesn't pay me anything until he makes a profit and the manufacturer gets cash and a satisfactory profit for everything he produces."

The construction used in the "Culp" tire is known as the "multi-ply cord." The materials are carefully selected and constructional features have been incorporated which make the tire unique and individual and, at the same time, simplify ordinary operations.

There is nothing in the make-up of "Culp" tires which requires special machinery or unusual individual ability, therefore, manufacturing can be carried out equally well in the smallest or largest plants.

Every distributor working under the "Culp" plan becomes an associate in a large group, enjoying all advantages of combined purchasing power and all the prestige and force of a group of men working toward the same end.

The "Culp" plan distributor takes his merchandise directly from the production room—as directly as if every "Culp" plan store were built wall-to-wall with a "Culp" plan factory.

Close co-operative association with other wide-awake distributors and manufacturers, backed by the associated experts forming George K. Culp, Inc., make the "Culp" plan distributor a tower of strength.

Yet a "Culp" plan distributor retains absolute control of his own business at all times. It bears the impress of his own personality, to which is added the combined personality of all his new associates. Instead of being a strictly local establishment his business becomes nationalized.

Twenty-four well-known factories are now producing all automotive accessories for hundreds of "Culp" plan stores.

A 24-page illustrated cost bulletin is now ready for distribution to interested dealers. Write George K. Culp, Inc., 56 West 45th St., New York, N. Y., for your copy and be sure to ask for "Series 3."

Precision Rear Traffic Signal a Boon to Motorists.

Realizing that the dependability of a rear stop light lies almost entirely in the construction and durability of the switch, the Precision Metal Workers first devoted their attention to this important detail.

The Precision switch is a cylindrical type, with bearings at both ends of the shaft—a construction that allows the use of an outside spring heavy enough to withstand the strain of constant operation and insures the opening of the switch when the brake pedal is released.

In a public demonstration in the window of a prominent accessory dealer on Michigan Ave., Chicago, one of these switches has now stood over a million operations entirely submerged in water and carrying a current for a 60-watt lamp.

NEW ERA Lower Prices The Dealer's Opportunity

The line consists of Standard Spring Bumpers, the stylish Duplex Bumper, De Luxe **all metal** Vizor, and Tire and Wheel Carriers of various types.

A comparison of these goods with others of the sort proves them superior in appearance, strength and utility. They are positively priced lower. No other accessories are backed by as strong guarantees.

The live dealer who makes a leader of the NEW ERA line will sell fast, make handsome profits, and add to his prestige as an accessory merchant.

Write for Catalogs



New Era Spring & Specialty Co.
56 Cottage Grove Avenue
Grand Rapids, Mich.

ADD \$500 a DAY TO YOUR PROFITS WITH a TORIT TORCH (No. 13)



TORIT ACETYLENE TORCH No. 13

For Radiator Repairing, general soldering, light brazing, heating, battery repairing, etc. Produces instant hot flame, works rapidly. Furnished with 4 different tips and soldering copper, enabling you to do a wider range of work.

USES ACETYLENE ONLY

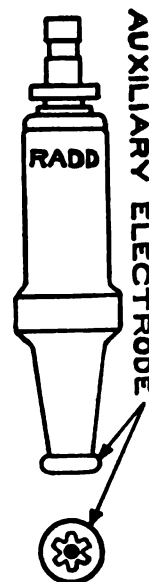
A splendid use for discarded auto acetylene tanks. Many owners make the Torit No. 13 pay for itself in a single day.

Torch with 4 different tips, soldering copper, 5 ft. tubing and connection for auto acetylene tank **\$7.50**

Order Today from your Jobber, or

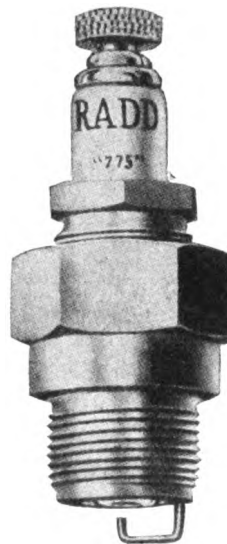
ST. PAUL WELDING & MFG. CO., 165 W. 3rd St., ST. PAUL, MINN.

The Reason Why RADD SPARK PLUGS



**FIRE where
others FAIL**

The Auxiliary Electrode (an exclusive RADD feature) produces a small spark in advance, greatly aiding the discharge of the main gap. The result is a larger, hotter spark than is possible with other plugs—which accounts for the fact that RADD Spark Plugs fire perfectly under conditions which cause other plugs to sputter and fail. This has been proven in thousands of instances on many makes of cars. A test will convince you. Such a test will likewise demonstrate that the RADD reduces vibration and makes the engine run more smoothly with less missing. Better ignition keeps the RADD spark plug comparatively free from carbon and oil deposits.



The RADD is extremely economical in operation. Other plugs require 60% more voltage to fire—another fact which may be proved by test.

RADDs burn up excess oil—Reduce carbonization—Fire on ignition systems too weak to produce a spark with ordinary plugs. Fire under 20 pounds greater compression than any other plug—THE AUXILIARY ELECTRODE DOES IT.

Made in sizes and styles for all automotive needs.

DEALERS—Sell the plug that improves the ignition of any car, truck or tractor. Send in the coupons today and get full information

LEICH ELECTRIC COMPANY

Genoa, Illinois

Leich Electric Co.,
Genoa, Ill.

Please send us complete information and trade prices on RADD Spark Plugs.

Name

Address

The lamp itself is a one-piece, drawn shell, with no outside connections or loose parts to be broken, lost or tampered with.

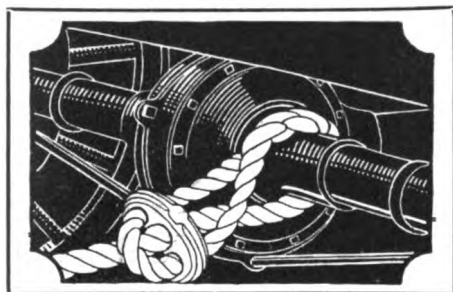
The lens is held in place by a compression ring that, it is said, makes the lamp dust and waterproof.

As a further proof of its reliability, the complete installation has been submitted to, passed a searching test, and been approved by the Underwriters' Laboratories.

The Precision rear traffic signal is manufactured by Precision Metal Workers, 3100-12 Carroll Ave., Chicago, Ill. The Precision Metal Workers also manufacture the Precision Hed-Lite glare reflector, Precision top convertor for changing the standard Ford top into a one-man top and the Precision wick feed oil cups.

Super-Strength at Low Cost a Feature of H. & A. Tugline.

"No, sir! Nothing but a Tugline will do for me," said the car owner to his dealer. That's what they all say when they know



Combines Strength, Flexibility and Service.

about the Tugline. Why? That's easy. Here are just a few of the reasons why car owners choose the Tugline:

It offers strength in excess of load requirements, combining great strength, flexibility and long service.

It is being offered at an exceedingly low price.

Coupling and uncoupling may be done with ease—there are no knots to tie.

Because of its compact form, it occupies a minimum of space in the tool box or other convenient place in the car.

No metal touches any part of the car.

The Tugline is made from the celebrated H. & A. "Blue Heart" manila rope—pure manila hemp, the toughest rope fibre grown. Every foot is guaranteed to be stronger than the U. S. Bureau of Standards' specifications for rope require.

Neither oil nor weather can hurt a Tugline. There is no hard rubbing of the metal parts and the Tugline grips the axle so that it is almost free from wear at that point. No metal touches the axle or any part of the car.

The length of the Tugline is 18 feet, giving ample space between the two cars and preventing danger of collision when the towing car slows down or stops.

There is no danger of injury to the axle of the car when towing as, if the strain is

too severe, the rope towline will break as a steel line will not do.

Tuglines are made in three sizes: For loads not exceeding 4,000 pounds gross, for loads not exceeding 6,000 pounds and for loads not exceeding 9,000 pounds.

Further details and prices may be obtained by writing the manufacturers, The Hooven & Allison Co., Xenia, Ohio.

Jenkins Offers New 8-Leaf Front Spring for Fords.

A new 8-leaf front spring for Fords, to retail complete for a very low price, is the newest addition to the famous Vulcan line made by the Jenkins Vulcan Spring Co., Richmond, Ind.

This spring is known as No. 2010, and is plainly stamped with the Vulcan trademark, carrying instant conviction as to its quality.

It is interchangeable with the original Ford front spring, without altering or substituting clips or shackles. While exceptionally low in price, the manufacturer has provided a liberal margin of profit for the dealer on this item.

"Oilwatch" a Boon to Ford Owners—Easy to Watch Oil Supply.

Everyone knows that proper oiling is one of the most important things to look after in the operation of a car, because of the many troubles that arise because of the lack of oil.

Burned-out bearings and scored cylinders result if the Ford's oil level is allowed to go too low. At the same time, too much oil means a costly waste and may cause carbonization and knocking of the engine.

Since the oil level of the Ford should be maintained between the two pet-cocks which are located underneath the car, it has been necessary heretofore to crawl under the car to learn the oil supply, involving the soiling of hands and clothing as well as being an uncomfortable and laborious procedure.

There's an easy way to watch the Ford's oil supply now. A little device known as the "Oilwatch" has been designed, which is simple and easy to install, and with which the car owner can tell the condition of his oil supply simply by reaching down from his seat, loosening the head of the "Oilwatch," pulling out the rod and making the reading. A child can do it.

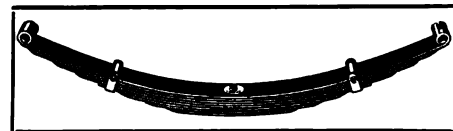
The "Oilwatch" is said to be absolutely reliable and foolproof, as well as giving exceptionally long service.

The installation is made through the floor board of the car, as will be seen in the illustration.

Dealers should find this device a ready seller in view of its convenience and the low price at which it is being offered. Full details may be obtained from the manufacturer, Philip Schaefer & Co., 20 East Jackson Blvd., Chicago.

Kendell Piston Rings Give Even Wall Pressure at All Points.

Kendell piston rings are of a new type—termed "even-radius"—having even wall pressure at all points. This is derived through a special returning process, producing a point of expansion every 30 degrees



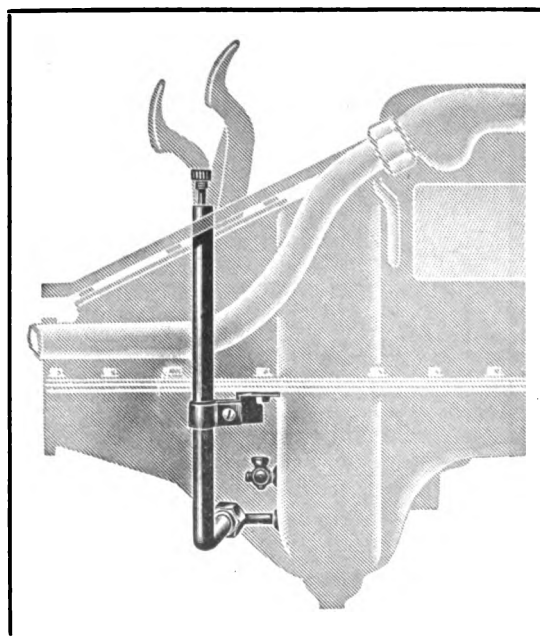
Jenkins 8-Leaf Ford Front Spring.

on the entire circumference, thereby eliminating "burning spots" that invite compression leakage. The rings are also provided with a non-clogging oil wiper at the bottom.

Kendell piston rings are of two-piece construction, an inner or expansion ring and an outer or packing ring, the latter being of softer metal and having a rapid seating feature. They are both cut on a 55-degree angle to relieve groove pressure and increase pressure on the circumference.

After extensive tests, it was made possible to produce a simple, durable and efficient piston ring with a number of entirely new features, making Kendell piston rings, it is claimed, irreproachable from a scientific, mechanical or practical standpoint and eliminating deepening of ring grooves, drilling of pistons, oil regulations, springs or pins that have to be replaced.

Kendell piston rings are backed up by the manufacturer with an absolute money-back guarantee. For further particulars address Kendell Engineering Co., Fort Wayne, Ind.



"Oilwatch" Simple and Easily Installed.


BRUNNER


THE FIRST

THE first successful motor-driven garage air compressor was a Brunner. For fifteen years this machine has been banging around, indoors and out, subjected to cruel and inhuman abuse.

It was built so well that it has never even needed overhauling. The owner, Mr. A. A. Ledermann, Pierce Arrowsales agent in Utica, writes:

"I wouldn't want to sell it for less than the price of a new

one because it's just as good as a new one could possibly be, except in appearance."

A modern Brunner is a better machine than Ledermann's—good as his still is.

There is a model exactly suited to your needs shown in our catalog—let us give you a copy. Ask the jobber's salesman who calls on you, for full information about the Brunner line. Don't let him sell you a cheap substitute.

BRUNNER MFG. CO.
UTICA, N.Y.

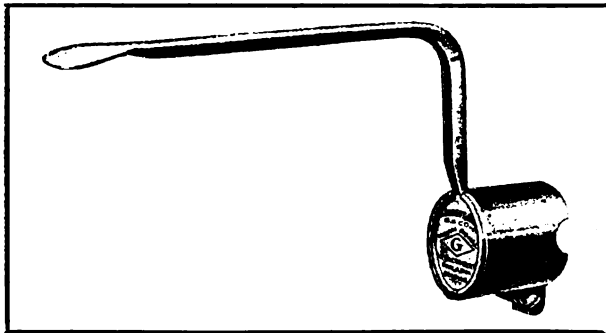
World's oldest and largest manufacturers of Garage Compressors

Sales Offices: Utica, Cincinnati, Kansas City, San Francisco

Ask an Engineer

Diamond "G" Horn Attachment for Fords Simple and Convenient.

Everyone who has driven a Ford car knows how inconvenient it is to reach down underneath the wheel and push the button in order to blow the horn. This, of course, necessitates taking your hand off the wheel, and it is also very awkward to reach.



Gilbert Diamond "G" Attachment for Fords.

The Gilbert Diamond "G" attachment for Ford horns is a very simple device and enables the driver to keep his hands on the steering wheel at all times. It can be easily and quickly attached to any Ford car that has a push button on the steering wheel. It is strong, simple and there is nothing to get out of order. It is guaranteed for the life of the car.

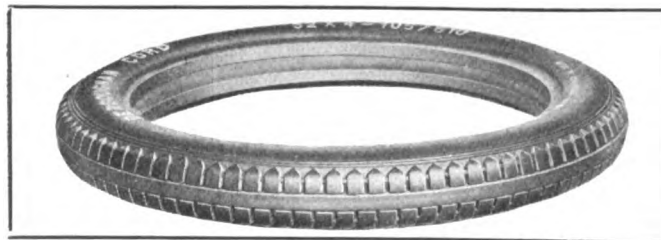
It is very easy to operate, as it is simply an extension lever which extends from the button and operates the horn at all times, the lever coming up directly under the outer rim of the steering wheel entirely clear from the spark and throttle. The horn can be sounded instantly and conveniently without removing the hands from the steering wheel.

The Gilbert Diamond "G" attachment for Ford horns is easy to apply, no boring or other changes being required.

A. Gilbert & Sons Brass Foundry Co., St. Louis, Mo., which manufactures the device, will gladly furnish complete details to those interested, upon request.

"Gold Seal" Tire Takes Place of Bergougnan Wrapped Tread Cord.

The Bergougnan Rubber Corp., of Trenton, N. J., announces a new moulded casing to be known as the Bergougnan "Gold Seal"



"Gold Seal" Takes Place of Wrapped Tread Cord.

tire, which is to take the place of the former Bergougnan wrapped tread cord.

This latest product of one of the oldest manufacturers of tires in the industry is a departure from the tread design hitherto

used, and it is said to be the "farthest north" reached thus far in the race for tire perfection.

This claim is probably open to argument, but it is presented by an organization with a record of 25 years of solid achievement and, as such, merits consideration.

Besides the Trenton factory, the company operates plants in France, Belgium, Italy and Russia.

New territory is now being allotted.

New Motor Oil Eliminates "Chattering" in Ford Cars.

J. D. Streett & Co., of St. Louis, Mo., have just announced a new oil for Fords that they claim will eliminate all "chatter,"

which is explained as "that uneven jerking of the transmission and brake bands which causes those nerve-racking vibrations whenever the foot pedals are used."

The engineering department of J. D. Streett & Co. has been striving for the last year to obtain an oil that will produce the perfect lubrication necessary to eliminate this great annoyance.

It is claimed that "chattering" is the cause of much unnecessary expense and wear and tear on the entire car, and that its elimination will not only cut down repair bills but will insure a greater degree of safety and satisfaction.

It is explained that the cause of this chatter is not due so much to the wearing out of the brake bands as to their becoming glazed through the use of an inferior grade of oil. When glazed, the bands grip the transmission in a jerky manner—they grab and then slip instead of taking hold in a gradual, smooth fashion. In order to eliminate this evil, it has formerly been necessary to renew the bands very frequently. This is an expense which is claimed to be saved through the use of the new oil which makes the glazed bands soft and pliable.

It is also claimed that this oil will lubricate perfectly, stop fouling of plugs, increase compression and power, eliminate oil carbon and, through perfect lubrication, will do away with that source of great annoyance and cause of expense and deterioration in a Ford—the chatter.

After putting a gallon of Streett's Ideal motor oil for Fords in a Ford crankcase, the brakes can be jammed on at 30 or 35 miles an hour, and the car brought to a gradual but positive stop without the slightest chatter.

While this oil—which is a new addition

to Streett's Ideal motor oils—is the direct result of a year of research and experiments, it can be pointed out that 37 years of business in the oil industry gave this company a foundation for this new product which is heralded as the ultimate oil for Fords.

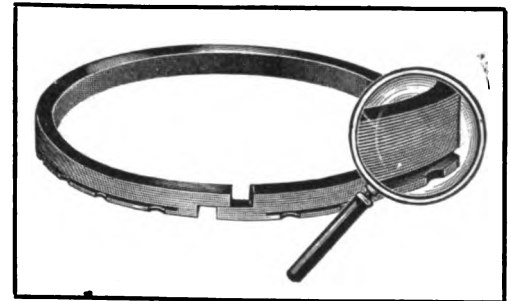
Descriptive literature and prices will be supplied to those interested, upon request, by J. D. Streett & Co., St. Louis, Mo.

Fit Out-of-Round Cylinders Quickly with Tell-Tale Rings.

The story of the development of the Tell-Tale piston ring is an interesting one. Four years ago the engineering experts of the St. Louis Piston Ring Corp. set to work to make a perfectly fitting piston ring.

In making this ring, they kept in mind the principle—familiar to automobile engineers and mechanics—that two pieces of metal, in order to join themselves perfectly, must wear together.

Constant expansion under intense heat,



Tell-Tale Rings Seat Quickly to Compression-Tight Fit.

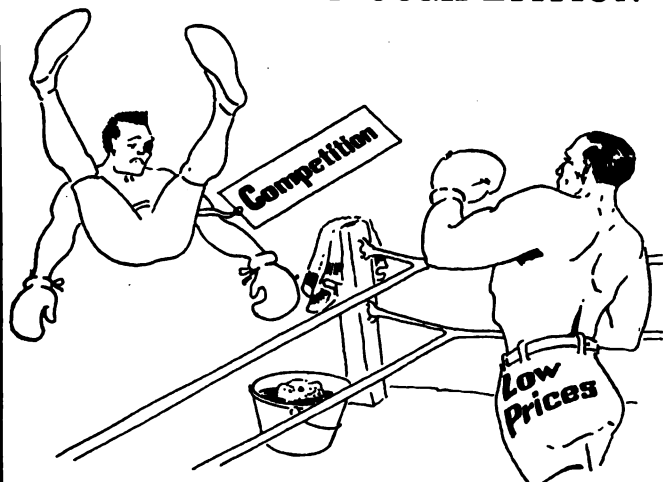
and contraction as automobile or other internal combustion engines cool, causes warping, so that after a few months' operation cylinders cannot be exactly round. While this out-of-roundness amounts to only 1/1000-inch to 3/1000-inch, it is ample to allow the escape of a considerable amount of compression unless the piston rings fit the out-of-round spots.

The surface of the Tell-Tale ring consists of a series of finely tooled "serrations" cut 2/1000-inch deep. These serrations, which are small projections on the surface, wear in to fit out-of-round cylinders very rapidly and, it is said, permit the Tell-Tale rings to seat themselves into a compression-tight fit in less than 100 miles of running.

Each serration carries a film of oil while wearing in, thus, preventing scoring. After the rings are perfectly seated, they present a smooth, hard surface and there is no friction and little additional wear.

The manufacturer guarantees that a set of Tell-Tale rings will stop oil pumping. This is accomplished by means of an oil channel in the wearing surface. A series of small outlets or "vents" to permit the excess oil to escape, are cut into the bottom of this channel and these prevent clogging. This excess-oil-elimination feature is also said to prevent fouling of spark-plugs and forming of carbon.

MEET AND BEAT COMPETITION



Thousands of TIRE DEALERS is the best testimonial we can offer.

We carry a full line of Standard make Firsts and Seconds at greatly reduced prices.

You can increase your sales and make a bigger margin of profit by dealing with us.

Write or wire for latest bulletin

**WE KEEP CONSTANTLY IN TOUCH
WITH OUR DEALERS**

Broadway Tire Jobbers, Inc.
252 W. 54th Street New York City

The Biggest Battery Value on the Market — at Less Cost

Dealers and Service men find it the easiest to sell and more profitable.

**"A STEWART they say—
keeps trouble away."**

STEWARTS assure greater satisfaction, more power and longer life.

Built to a principle of SERVICE and backed by TWO-YEAR WRITTEN GUARANTEE.

Wide-awake dealers are selling STEWART Batteries—and more every day—why not you?

Delay will mean loss of nice trade.

Stewart Storage Battery Co.
MARSHFIELD, WIS.



Our exceptional selling plan and sales co-operation offer one of the biggest inducements ever known in the automotive line. Your territory may be open. We want to meet dealers alive to STEWART'S exclusive agency sales plan. Write us today, stating your business responsibility complete.



Results tell the tale

A perfectly made piston ring, equally efficient for compression and oil troubles, with an oil-sealing, oil-controlling channel, the only one with outlets to release excess oil, preventing clogging. The "self-seating" surface fits itself to out-of-round cylinders. 3 rings are installed on each piston.

Fit Themselves to the Cylinder

All cylinders, after a few months of service, become slightly out-of-round, due to constant expansion under intense heat and contraction when cooling. All Repair Men are familiar with this condition, which is found in most motors requiring new piston rings.

Unless the new rings fit these out-of-round spots, there will be an escape of compression. No piston ring can be manufactured which will immediately fit such cylinders. To secure a perfect fit the rings must wear in to fit the imperfect cylinders. No piston ring with a smooth, hard surface can do so, because when it comes in contact with the highly glazed cylinder walls, with a film of oil between, there is no "give." Such rings often take months of running before the car has even fairly good compression. But the Tell Tale ring gives perfect compression from the start. It has a "serrated" surface consisting of a series of finely tooled spirals 2-1000 inch deep, cut on the wearing surface. These allow the rings to fit themselves to the exact shape of each cylinder in a few hours of running.

Stop Oil Pumping

By means of a special, patented oil channel with outlets the Tell Tale ring absolutely stops "oil pumping." It is the only channel with outlets to release the oil on each up-stroke; it cannot carbonize or clog.

Guaranteed to give complete satisfaction, on "money back" basis.

Write for Descriptive Folder and Discounts

Complete descriptive folder, "The Balance of Power," will gladly be sent on request. Address factory or nearest Distributor listed below. Good discount to Dealers and Repair Shops. We also have an especially attractive Service Station proposition for responsible Dealers who will carry a small assorted stock. Ask for details.

St. Louis Piston Ring Corp.

1802 S. 2nd St.

St. Louis, Mo.

Principal U. S. Distributors

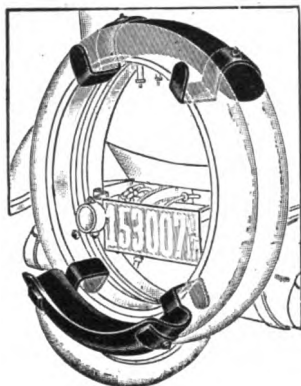
Tell-Tale Piston Ring Sales Agency, 1512 Vine St., Phila.
Bearing Specialty Co., 160 Massachusetts Ave., Boston
Frank W. Wood Co., 70 W. New York St., Indianapolis
Lynskey, Neal & Lynskey, 3302 Bigelow Blvd., Pittsburgh
Acme Piston Ring Co., 2017 S. Michigan Blvd., Chicago
The Standard Metal Goods Co., 2080 E. 30th St., Cleveland
The Motor Industry Spec. Co., 1807 McGee St., Kansas City
The Miller-Wiegand Co., 217 N. Main St., Dayton

Canadian Distributors, The Standard Metal Goods Co.
170 King St., West, Toronto, Ontario, Canada

TELL-TALE
TRADE MARK
PISTON RINGS

A constant film of oil—not too much—between the piston rings and the cylinder wall seals compression into the combustion chamber to be fully utilized. The oil channel is so constructed that, while all of the excess oil is constantly released, through the outlets or vents, a small amount is retained even after the engine is stopped.

This facilitates starting by spreading an



Model "Y" 2-R-3 Tire Carrier.

even film of oil over the cylinder walls, making it easier for the motor to turn over. Should the car run out of water, this oil film will delay the pistons sticking and scoring cylinders, although it cannot, of course, do so permanently.

The Tell-Tale compression-tight joint is simple, easily fitted and gas-tight. Tell-Tale rings are installed snugly, so that the ends of the joint just meet. There is no danger of the rings "binding" as the quick-seating surface starts wearing immediately after the motor is started. The joint can easily be dressed down slightly when necessary, thus permitting the ordering of ample oversize.

A one-piece ring, cast of the finest dense-grained grey iron, the Tell-Tale is tough, resilient and long-wearing and will retain its tension for years. Concentric, micro-metrically accurate and free from imperfections, Tell-Tale rings are guaranteed against breakage.

Descriptive literature and prices may be had upon request from the St. Louis Piston Ring Corp., 1802 So. 2nd St., St. Louis, Mo.

Thousand-Mile Guarantee Given With All Sav-Oil Piston Rings.

Every Sav-Oil piston ring comes to you with the manufacturer's guarantee that it will positively give 1,000 miles to the gallon of oil, provided the cylinders are not scored or out of round over 0.005-inch.

Much motor trouble and expense is caused by oil passing the rings and forming carbon, resulting in heavy valves, carbon, etc.

This ring has been constructed to take advantage of the little compression that leaks past the compression rings. When the piston goes up on compression, this lost compression strikes the bevel edge of

the ring. The ring collapses and skips a large portion of the oil on the cylinder walls. On the downward stroke of the piston, the ring expands and wipes the surplus oil back to the crankcase.

Holes are drilled in the back of the ring to relieve the vacuum, thus allowing the ring to collapse freely.

Dealers and others interested can obtain complete details regarding the Sav-Oil piston rings by writing to Sav-Oil Piston Ring Co., 2056 Jackson Blvd., Chicago.

2-R-3 Tire Carriers for Cars Originally Equipped for One Tire.

A simple and easy solution of the often arising problem of carrying two spare tires on a car originally equipped for only one, is the 2-R-3 tire carrier, manufactured by the International Stamping Co., Chicago.

This carrier is made in two styles—models "S" and "Y."

Model "S" carrier is used in two ways. First, for carrying a single spare, the crescent portion of the carrier is hung on top of the tire carried on the car and the spare supported by the hooks extending under the rims. To carry an additional spare, another "S" carrier is hung on the rim of the spare—the crescent portion providing a rest for the additional tire, or, of course, if desired, may be used in either position.

The model "Y" is suspended, as shown in the illustration, from the top of the first tire, the bottom forming a cradle for the spare and additional 2-R-3 carriers and tires may be added as desired.

A tail-light and license bracket is also provided at a slight additional cost, which may be secured to the center bar of the model "Y" carrier, thereby bringing the tail-light and license number even with the last tire.

The International Stamping Co., 400 North Leavitt St., also makes an extensive line of side and rear tire carriers, sport fenders and other sheet metal constructions for automobile use.

Those interested can obtain complete details, prices, etc., by writing the manufacturer at the address which has been given.

Sterling Ammeters and Voltmeters Give Long and Accurate Service.

Accuracy, durability and an unusual overload capacity are notable features of the Sterling Model 500 dash ammeters and voltmeters.

Although designed especially for automotive use with starting and lighting systems on automobiles, trucks, tractors, motorboats and airplanes, these meters are also adapted for use on any direct-current circuit where instruments of their size and range can be installed.

Being built to withstand the vibration and rough treatment incident to automotive use, they are unusually efficient, it is said, when mounted on stationary equipment such as small switchboards, charg-

ing panels, farm lighting plants and similar units.

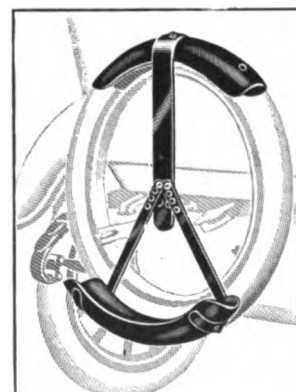
Model 500 Sterling ammeters are especially designed to register accurately, when in actual use on gas-engine-driven vehicles, under the effects of road motion and motor vibration. Provided with zero center scales, they show constantly the correct rate of battery charge or discharge, which is essential to the proper care of the generator and the storage battery.

These instruments are of the permanent magnet, soft-iron vane type, and can be depended upon to perform satisfactorily in any direct-current circuit within their range. They are not only accurately calibrated and eminently practical but are also neat and attractive in appearance.

Two particular points of excellence to be noted are: First, the damping device which secures a "dead beat" pointer. It permits the use of a light and durable moving element and the "dead beat quality" is not attained at the expense of sensitiveness.

The second is the distribution of parts in such manner that a constant magnetic force is maintained under all conditions. This, it is said, enables the instrument to carry a large temporary overload—up to eight or ten times its indicated capacity—without suffering any injury. Because of this ingenious arrangement, the accidental discharge of the entire storage battery momentarily through the instrument—a thing which frequently happens when starting systems are being connected up—produces no harmful effect.

Sterling Model 500 voltmeters are exactly the same in size and outward appearance as the ammeters, and the same excellent qualities have been incorporated in their electrical design. They are especially built to read correctly while continuously in circuit, and are thoroughly accurate and durable in service. Model 500 voltmeters are



Model "S" 2-R-3 Tire Carrier.

offered with both the center zero and one-way scale.

In addition, the same manufacturer is offering the Sterling pocket-type battery meters, made in two different sizes—one for ordinary pocket use and the other, which is smaller and more delicate in appearance, for vest pocket use. The larger size is known as the Sterling and the

Profit From A New Source!

—A new kind of tow rope
that sells on sight

The "Tugline" is a new and entirely different kind of tow rope, made of pure manila, the toughest rope fibre grown.

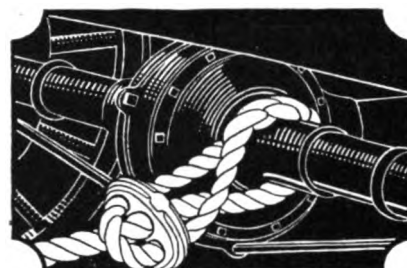
It is made in three sizes for cars or trucks up to 9000 lbs. gross and is the only tow rope on the market which combines all these advantages:

1. Low price (can be retailed at \$2.50 to \$5.00)
2. Long wear
3. Excess strength
4. Easily coupled and uncoupled

5. Occupies small space
6. No metal touches car.
7. Light weight
8. Can't rust or corrode
9. Won't kink or fray out.

There is nothing else like the "Tugline", and its low price instantly appeals to the motorist as a big value—he can't resist it.

Order from your jobber, or write us giving his name, and we will see that you are supplied.



The "Tugline" attached to axle. Loop end of rope is simply thrown over axle and sides of loop pushed under strong metal clamp. Removed in a jiffy.

"The Tugline"

Trade Mark

Made from the celebrated H. & A. "Blue Heart" Manila Rope
SEND FOR DESCRIPTIVE CIRCULAR AND PRICES

THE HOOVEN & ALLISON COMPANY, Xenia, Ohio

"Spinners of Fine Cordage Since 1869"

LET'S HAVE THAT NEXT ORDER!

**When you need a Doctor
Do you get estimates?**

NO! you engage a Physician in whom you have confidence. That's why you use F.A.A. ALUMINUM and CAST IRON MENDS. You have confidence in them in making permanent repairs, such as scored cylinders, cracked water jackets and aluminum castings.

**F. A. A. Aluminum and Cast Iron
Mends go straight to the job.**



**Distributors—Dealers—Agents
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Western Distributor
CARL M. ANDERSON, Vineburg, California

CUT COUPON ALONG DOTTED LINES

FREE!!!



PACK IN LIGHT GREASE
TOQUET TIMER ROLLER
Price \$1.00 Each

A "Toquet Timer Roller" for the Ford Car will be sent **FREE Parcel Post Prepaid** to any Dealer or Garage clipping this coupon and mailing same, attached to business card or letter head, to:

Reliance Automotive Devices
INCORPORATED
DEPT. 6-C 243 W. 55th ST.
NEW YORK

You will see by the Toquet Timer Roller the quality of special equipment we make for the Ford Car. Every one, of which, has been designed to fit a long felt want.

Here are some of our specials. They sell on sight. Literature and prices sent on request.

| | |
|------------------------------------|-------|
| RELIANCE OIL GAUGE..... | _____ |
| SAFETY FIRST OILING SYSTEM..... | _____ |
| COMFORT SPRING OILERS..... | _____ |
| TOQUET WATER CIRCULATING PUMP..... | _____ |
| " FORD CARBURETOR..... | _____ |
| " TIMER ROLLER..... | _____ |

Check (✓) the items you are interested in with absolutely no obligation on your part. Give your name and address below.

smaller as the Trescot, to distinguish them.

The Sterling instrument, being the larger, has a larger scale and finer scale divisions. Within their respective ranges, however, both types serve the same purposes and may be used with the same confidence, it is claimed.

The Trescot instrument is exceedingly thin, since a thick meter is inconvenient for pocket use, no matter how small the diameter.

These instruments are nearly "dead beat." The indicator needle comes to rest without noticeable fluttering, thus saving the time of the user as well as saving the strength of the cell. It is not necessary to hold these meters in any particular position while testing. The indicator hand points accurately without regard to the position of the instrument.

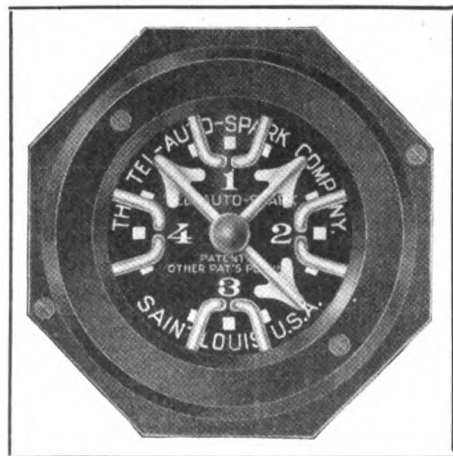
Prices and descriptive literature will be mailed upon request by the Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, Ohio.

New Automobile Accessory Detects Engine Trouble.

After three years of experimenting and road tests, the Tel-Auto-Spark Co., of St. Louis, Mo., began production the week of February 6. It recently leased, and is now occupying, one-half of the fifth floor of the Pontiac Building and is working full time producing Tel-Auto Sparks to fill various contracts closed with factory representatives in Illinois, Indiana and Missouri.

The Tel-Auto-Spark is an automobile instrument about the size of a speedometer, which, it is said, regulates the motor, locates troubles and eliminates minor repair bills. It registers each explosion of the different cylinders and, through scientific elimination, deduction and wireless resistance, tells of any ignition or carburetor troubles when they first occur.

There are no moving parts in the in-



Tel-Auto Spark Tells of Ignition Troubles.

strument to get out of order, nothing to rust, and nothing to oil.

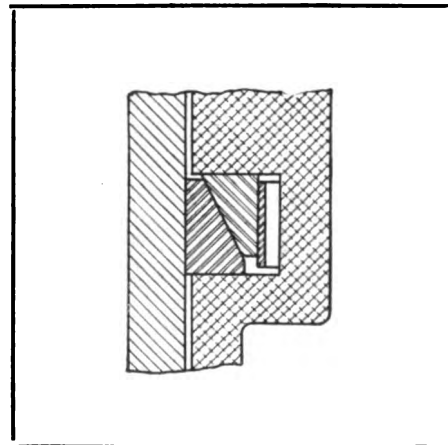
The radium dial as used on the Tel-Auto-Spark is of the same grade of luminous material as that used on watches. The electrical sparks that play above the radio

lite figures and calibrations of the Tel-Auto-Spark have the same rays as the sun and this continuous sparking recharges the luminous qualities of the radiolite material on the dial.

A Piston Ring That Actually Stops Oil Trouble.

In the accompanying illustration, a cross-section of the 3-A piston ring of the Steel Spring Piston Ring Co. is shown. Two pieces of Mohegan brand metal of triangular cross-section form the members of the ring.

The outer, or wear member, which it will be noted has the same bearing surface as a



Cross-Section of 3-A Piston Ring.

one-piece ring, is kept snugly against the cylinder walls at all times and at all points. It is also kept snugly against the top of the piston groove at all times; as is the inner member against the bottom of the piston groove. This is accomplished by the spring backing or insert, in connection with the tapers of the two members.

The 3-A piston ring, it is said, thereby actually seals the piston groove, except at the joint, through which is secured a constant and proper amount of lubrication, which is the same at all times whether the rings have gone 1,000 or 10,000 miles.

The oil leak, which causes fouled plugs, carbon and other troubles, is caused, not by the oil passing between the rings and the cylinders, but by the oil working behind the ring at the bottom, out again between the ring and the top of the piston groove and eventually into the combustion chamber.

This cannot happen with 3-A piston rings, as only sufficient oil passes the joint for proper and constant lubrication, the ring groove being actually sealed by the ring. There is no hammer action.

Due to the special material used and to the patented construction of the ring, it will take care of cylinders up to 0.008 inch out-of-round, and is being used by many mechanics on motors where formerly reboring and regrinding were necessary. This elimination of reboring and regrinding means a material saving to the car owner.

Aluminum-pistoned motors are notorious oil leakers. 3-A piston rings will stop the oil leak on these aluminum pistons and cushion the piston slap.

The ring is manufactured by the Steel Spring Piston Ring Co., 147 Metropolitan Ave., Brooklyn, N. Y., which has distributors in most of the principal cities, although there is still some territory open.

Toquet Timer Roller Is Self-Lubricating And Self-Cleaning.

A new Toquet product which has considerable merit has been placed on the market. It is a timer roller which does not depart radically from the design of the regular Ford timing equipment. In fact, the Toquet is simply an improvement which corrects the long evident faults in the construction of the Ford timer roller.

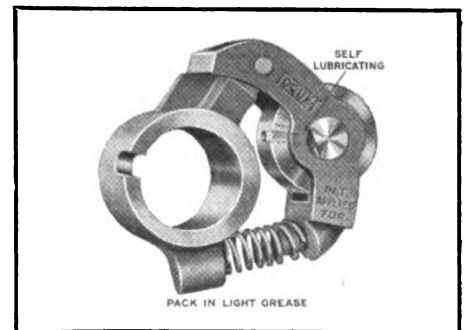
It is a well-known fact that the wear on the roller and timer shell is caused by arcing. After grooves have thus been made in the timer shell the Ford roller, suspended as it is beyond the spring, bounces considerably, causing the roller to jump the segments and the engine misses fire. A shell in this condition is generally thrown away.

Correcting this faulty construction, the Toquet timer roller is placed between the hinge and the spring with the roller slightly at an angle with the timing shaft amounting to $\frac{1}{4}$ -inch to the circle.

This makes the roller have a tendency to run off the race, but held firmly on the shaft gives a slipping and rolling action. This will smooth out old discarded timer shells and make them again useful or when used with a new timer shell, prevents grooving.

A further advantage of the Toquet timer roller is that the timer shell can be packed with light grease which minimizes arcing.

The Toquet roller, it is declared, will last the lifetime of the car, giving positive contact. This assures easy starting and a smoothly running motor. The confidence

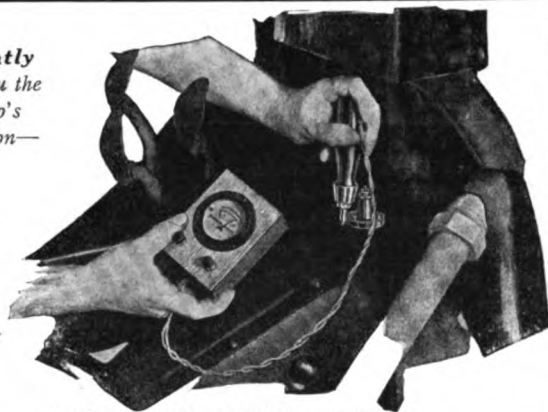


Toquet Assures Smoothly Running Motor.

of the manufacturers "in the Toquet timer roller" is shown by an offer to distribute a roller free to readers of the AMERICAN GARAGE & AUTO DEALER.

You can obtain further details regarding the Toquet timer roller by writing to Reliance Automotive Devices, Inc., Dept. 6-C 243 W. 55th St., New York, N. Y.

Instantly
tells you the
magneto's
condition—



"LOW, FAIR, GOOD or HIGH"

The Sterling Magneto-Meter is a complete and accurate device made with special regard for convenience and speed in testing Ford Magnetos. Contains a standard Sterling alternating current voltmeter and is useful for testing any low tension magneto. Equipped with special one-hand contact handle and cord for quick tests. For more accurate tests while car is in motion leads can be connected direct to Magneto-Meter terminals.

WRITE FOR BULLETIN NO. 19

Sterling Products.—Dash Ammeters, Polarity Indicators, Pocket and Dash Meters, Portable Rectifiers and Spring Oilers can be obtained at most jobbers. If your jobber cannot supply you, send his name and write direct to—

The

Sterling

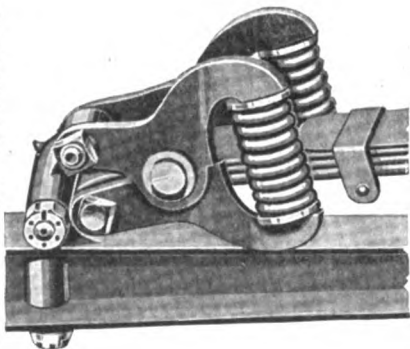
Manufacturing Company
2849 Prospect Ave. Cleveland, O.

The Largest Producers of Dash Ammeters in the World



Star W-X Outshines All Other Ford Shock Absorbers

Give the greatest flexibility and comfort on either a normal or full load. Do not affect spring mounting of Ford Car. Simplest and easiest to install—car owner can do it himself. The biggest shock absorber ever offered at the price—\$8.00 per set of four. Three styles—No. 1 for Runabouts, No. 2 for Touring, No. 3 for Sedans. DEALERS—Here's a real money maker. Write today for full data.



STAR SPECIALTY MANUFACTURING CO.

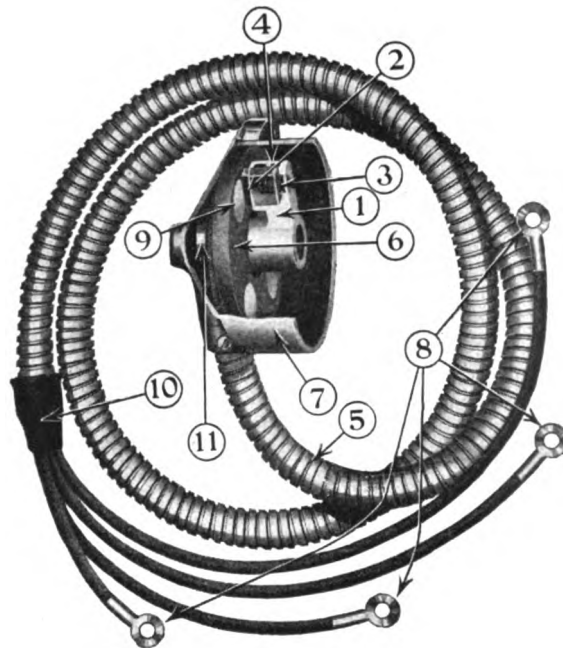
227-233 W. Erie St.

CHICAGO, ILL.

THE TURNER

2 in 1

TIMER



A fast selling product that will give lasting satisfaction to every Ford owner. Made for Ford cars, trucks and tractors. Assures an easy start in any weather, lessens fouling of two front plugs, saves gasoline, stops "kicking", is oil, grease and water-proof. Requires no oiling and is easily installed.

1—Brush container is of special alloy metal, and will last indefinitely. 2—Contact brush of specially treated phosphor bronze. 3—Contact spring is of high grade piano wire telescoping type. 4—Stop pin which holds brush in place. 5—Flexible metal conduit cord packed; which entirely houses all wires. 6—Genuine Bakelite insulated Timing Disc. 7—Timer shell of aluminum. 8—Note the four different lengths of wires, the only wires that you have to connect. 9—Hardened brass contacts of best quality are used. 10—Snug fitting rubber Nipple. 11—Hub inclosure for wire protection. Timer and wire assembly complete\$3.60

TURNER SPRING LEAF SPREADER AND LUBRICATOR

—Greatly increases riding qualities of any car, stops squeaks and spring breakage and increases spring wear. Makes steering easier and saves tires. The only device made that spreads spring leaves and lubricates them in one operation without fuss or muss. The grease goes just where it is needed and nowhere else. For all cars. Price\$2.50

For convenience of car owners we furnish one pound cans of special spring lubricant for use with our lubricator. Price\$5.50



TURNER FORD FOOT ACCELERATOR

A positive, simple, durable, inexpensive foot throttle. Installed by anyone in 10 minutes. Permits use of both hands in driving. Price complete with foot rest \$1

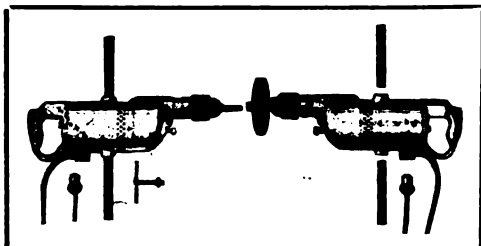
TURNER MANUFACTURING CO.

KOKOMO, INDIANA

Up-to-the-Minute Garage Equipment

Garagemen! You'll Like This New Portable Electric Drill and Grinder.

To the garageman and repairman who has been performing drilling and grinding oper-



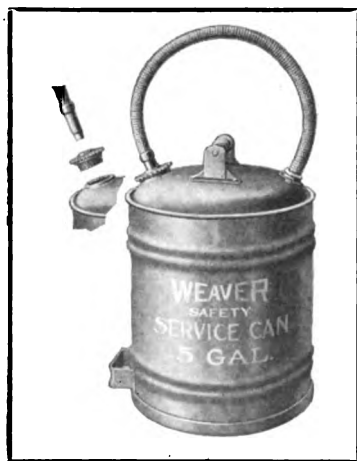
"Wodack" Combination Drill and Grinder.

ations by hand because he has felt that he did not have enough of either type of work to justify the purchase of two separate machines, the news of a new portable electric drill and grinder which is now being placed upon the market will be most welcome.

This new tool is known as the "Wodack" combination portable electric drill and grinder, and is so constructed that, by the use of one motor, it has the desirable speed for drilling as well as the proper speed for grinding. Two separate speeds are provided, the slow speed for drilling and the high speed for grinding.

The motor is of the universal type, and can be operated on both direct and alternating current of the same voltage. The speed change is a very simple operation, as is the operation of changing the grinding wheel attachment in place of the drill bit or vice versa.

In addition, this tool is fitted with a



Weaver Safety Service Can Saves Time.

switch located in the top handle, of the quick make-and-break control at all times. Aluminum castings and ball bearings are used throughout. The construction is simple, and yet is so rugged as to withstand the hard service to which a tool of this kind is frequently subjected.

The complete weight of the "Wodack" combination portable electric drill and grinder is only 18 pounds, while the motor develops $\frac{1}{2}$ -horsepower under load.

In addition to the regular guarantee of one year against electrical or mechanical defects, the manufacturer also agrees to rewind the motor once free of charge during the same period should it burn out for any reason.

The entire tool is built in the factory of the manufacturer, the Wodack Electric Tool Corp., 23-27 So. Jefferson St., Chicago, from whom further details concerning this time and labor saving tool can be obtained upon request.

Two Tools in One—Onan Lathe and Mica Undercutter.

A combination unit which, it is said, makes it possible to true up and turn the commutator of any starter or generator armature in the same manner as with the large engine lathe, can be had in the Onan lathe and mica undercutter.

Further, it is stated, that, without removing the armature from the lathe, it is possible to undercut the mica between the bars in a workmanlike manner in less time than by any other method.

The turning tool is controlled by hand-wheel screw feed and the carriage is operated by a drop-forged handle with suitable adjustment for every commutator. The undercut is straight and uniform.

The lathe is built with a 7-inch swing, a bed 22 inches long, and is furnished with two Armstrong high-speed tool bits, lathe dog, suitable wrenches, etc. It is complete and ready for operating, and may be driven from any available power or from the Onan testing device.

Write David W. Onan, 43 Royalston Ave., Minneapolis, Minn., for details regarding this new tool which is being offered at an attractive price.

Don't Bother with Funnels—Get a Weaver Safety Service Can.

"Go-Getter," they called Jimmy Dole, and his record for quick and reliable service was known for miles around. Somebody asked Jimmy the other day which factors he thought were most responsible for his success.

"The same old three," he answered with a grin, "Courtesy, service and just keeping everlastingly at it." "But," he added thoughtfully, "I think there is another big factor. It is that I never overlook a chance to keep my equipment right up-to-date. Just take, for instance, that new Weaver safety service can over there.

"Before I got that can I was continually

looking for funnels—sometimes our service wagon got out on the road without taking one, which meant delay and inconvenience. There was a lot of waste through gasoline being spilled. Once I barely missed losing everything I had because some careless idiot threw a cigarette butt into an open can—only thing that saved me from a big fire was that it just happened to be nearly empty.

"Now this Weaver safety service can is



Safe and Convenient When Road Servicing.

practically air-tight after the nozzle of the flexible steel hose is inserted in the vent in the screw-cap, and this prevents any spilling or evaporation. When the nozzle is withdrawn from the cap, preparatory to discharging the contents of the can, the open vent insures a free flow of the liquid. And, of course, with this sealed container, there is little danger of fire.

"No matter how obstructed by tires or inconveniently located the opening of the fuel tank may be, it is readily reached by the flexible steel hose and so, of course, I no longer need special funnels.

"It's easy to fill and I find it especially convenient when we have to send gasoline out in the service car to cars that have run out of gasoline on the road. In fact, I consider my Weaver safety service can a fine example of the value of having equipment of the right sort."

Heavy, galvanized iron, strengthened by horizontal ribs, is used in the construction of the Weaver safety service can. The bottom of the can is specially reinforced to prevent leaks, and the 2-foot, flexible hose is said to be practically indestructible. It is equipped with two handles and has a capacity of five gallons up to the rim.

The reliability and practical utility of Weaver products are well-known and this new Weaver product is a worthy addition to a splendid line of garage equipment.

Descriptive literature and prices may be had upon request from the Weaver Mfg. Co., Springfield, Ill.

"NATIONAL" GUARANTEED Coupon Books

**Draw Business Like a Magnet for Garages,
Filling and Service Stations**

You can substantially increase your gasoline, oil and accessory sales and at the same time please your customers by using National Guaranteed Coupon Books. Car owners appreciate the convenience afforded by National Coupon Books and prove ready purchasers.

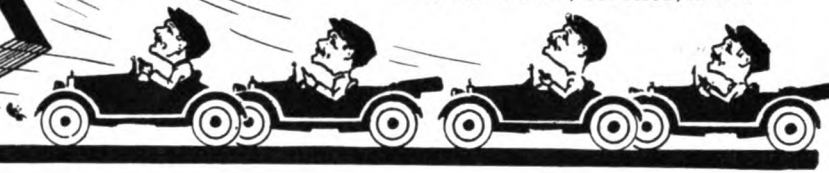
The motorist with a National Guaranteed Coupon Book will drive blocks out of his way to stop at the station where these coupons are redeemed because he knows he will get quicker and more accurate service. You eliminate a lot of bookkeeping and save time on every customer you serve. National Guaranteed Coupons will prevent errors and those vexatious disputes which lose customers.

National Guaranteed Coupon Books can be either sold for cash or used for charge business. In either case they will make your sales soar.

Write us at once for samples and prices

NATIONAL CHECKING COMPANY

271 Chestnut St., ST. PAUL, MINN.



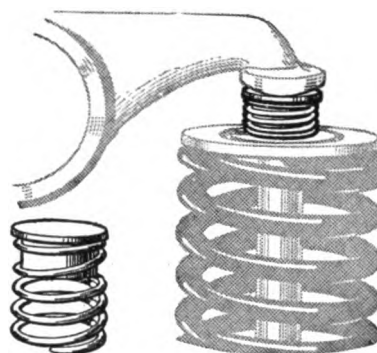
*A line that
will pay
you to sell*

SUPERBESTOS Folded and Stitched BRAKE LINING

outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.

DEALERS and REPAIRMEN—
Write for data and prices on brake
lining, clutch facings, Ford Trans-
mission lining, running board mats
and packings.

Manufactured by
MIKESELL BROTHERS COMPANY
156 No. La Salle St., Chicago, Illinois
Plant and Works, Wabash, Indiana



LANE ROCKER ARM SILENCERS

LIST PRICE
\$2.00
PER SET

For Overhead Valves

Here's a fast selling device which every owner of an overhead valve car needs. It eliminates the annoying tapping of the rocker arm. It makes the motor run as quietly as new. Easy to attach. No adjustments. Just the product you should carry in stock. Fill out the coupon and mail.

NATIONAL EQUIPMENT CO.

Commercial Trust Building
Philadelphia, Pa.

CLIP AND MAIL—It Will Bring You an Attractive Proposition

I am interested in carrying a stock of Lane Rocker Arm Silencers. Send information at once.

Name

Street

City..... State.....

The Care of Gasolene Pumps During Cold Weather.

By C. E. Pask, Advertising Manager,
Wayne Tank & Pump Co.

Atmospheric conditions and changes in the weather, particularly during the winter, are the causes of a certain amount of moisture collecting in all gasolene pumps and underground tanks.

A few makes of gasolene pumps are equipped with filtering devices that separate the water from the gasolene. It is very important that all gasolene pump owners drain the filter on their pumps during cold weather. If this is not done frequently the pumps will freeze and cannot be operated.

All that is necessary to drain a filter is to open the valve of the filter drain-off cock and operate the pump handle slowly. This will cause all water collected in the filter to flow from the pump. You can tell when the filter is free of water by using an ordinary water-glass or other transparent receptacle, as the water will always settle to the bottom of the glass.

It is important that the pump plunger be returned to the bottom of the cylinder after such an operation.

If by any chance you have neglected to properly drain your filter and the pump freezes, do not attempt to thaw it out by using a torch of flame of any kind. Use a spray of steam if possible. If not, heat two or three bricks or light an equal number of electric light globes and pack them around the cylinder of the pump and close the pedestal door. Such treatment will take care of the ordinary cases of pump freezing. If, however, the pump is frozen solid it will be necessary to take the cylinder entirely off and thaw it out indoors. Do not use any flame, however.

If you drain your filter two or three times a week in cold weather you will not be bothered with your pump freezing.

Water very frequently gets into the gasolene before it gets into your underground tank. If such is the case, it will be necessary to get it all out or the pump will continue to freeze. You will seldom experience any difficulty in this respect unless you allow the tank to become entirely empty. Water always seeks a lower level than the gasolene; hence, it remains on the bottom of the tank.

It is just as important to have all joints absolutely tight so that no water can seep into the tank. Particular attention is called to the packing nut on top of the underground tank.

Fire Destroys Plant, Warehouses and Offices of Shaler Company.

On Thursday, March 2, the entire plant, warehouses and offices of the C. A. Shaler Co. at Waupun, Wis., manufacturer of the Shaler vulcanizers and roadlighters, were destroyed by fire. All contents including stock, material and machinery were a total loss and only the office records and furniture and a few of the most valuable

patterns were saved. Three girl employees lost their lives, but miraculously there were no other serious injuries.

The morning following the fire the company was functioning in temporary offices. Manufacturing is being resumed in temporary quarters and deliveries are expected to be made within 30 days. Architects are already at work on plans for a new factory of sawtooth steel construction, work on which will be commenced immediately.

Bureau of Standards Considers Headlight Tests.

A great deal of interest is now being shown in regulations governing the headlights used by motor vehicles. The United States Bureau of Standards has assisted local authorities and the manufacturers through tests of these devices, and already quite a number of the states have framed laws to govern the use of lights on automobiles. The matter is one which should receive uniform treatment, and this has been recognized by nearly all those concerned in the subject.

In order to secure a satisfactory degree of uniformity in all parts of the country, it will be necessary to have (1) uniform laws, (2) uniform procedure in the enforcement of the laws, and (3) an extensive campaign of education both for enforcement officers and garagemen and drivers of automobiles.

The establishment of headlight adjusting stations in garages has been found to be a very desirable step, and such adjusting stations have already been used in a number of states and cities under more or less definite official regulation. So far as uniformity of legislation has been obtained among the states, it has been based upon the specifications formulated by the committee on motor vehicle lighting of the American Illuminating Engineering Society. These specifications have been adopted in practically the same form by nearly a dozen states.

At the time they were formulated it was believed that the specifications were as rigid as could be enforced, but recently even more rigid regulations have been adopted in some sections.

In view of this situation, the above-mentioned committee at a meeting on February 8 decided that a revision of its specifications should be made. In accordance with this decision, the values specified for light on the road were considerably increased while the limiting values which are intended to control glaring light were left unchanged.

Other changes were also made. As many devices approved under the present regulations would not satisfactorily meet the requirements of the revised ones, it is probable that these specifications will only be recommended for adoption at some definite period in the future, presumably 2 or 3 years.

With the idea of securing uniformity in the adoption of such regulations, an infor-

mal organization of state authorities representing the whole of New England, New York, New Jersey, Pennsylvania, and Maryland has been formed. Another meeting of this organization will be held at Harrisburg in April, and it is understood an attempt will be made to establish a board of officers charged with approval of devices in all states represented.

Paragraph.

THE NATIONAL REFINING Co., Cleveland, Ohio, has recently announced the appointment of K. R. Horn as manager of The National Refining Company at Oklahoma City, Okla.

A. O. SMITH, CORP., Milwaukee, Wis., has published a small folder, designated as Publication No. 101, and describing and illustrating the new Smithsteel running boards for Ford cars.

The title of the folder is "Adding Class and Resale Value to Your Car." Illustrations of both the linoleum and aluminum covered boards are included as well as prices.

E. E. WARFIELD, better known throughout the automotive trade as "Dave," has just been appointed sales manager of the Gill Mfg. Co., Chicago, makers of Gill one-piece piston rings.

Mr. Warfield has a long record of sales success in the industry, having been connected with Post & Lester Motor Car Equipment Co., Westmore Savage and other well-known jobbing houses. For the past two years he was with the Boston branch of the Gill company.

Mr. Warfield plans an early "swing around the circuit" to acquaint the jobbing and distributing organizations with the plans of the Gill company for making 1922 a record year for the sale of rings.

The reduction in price, recently announced by Gill, is expected to be a big factor in accomplishing this result. Already a hearty response is noted from all trade channels.

EDWARD V. HARTFORD, INC., 35 Warren St., New York City, makers of Hartford shock absorbers, Hartford spring bumpers and Hartford automobile jacks, have announced the appointment of S. X. Newman as director of sales.


Mr. Newman recently severed his connection with the Automatic Safety Tire Valve Corp. to accept this new position with Hartford, Inc.

COSTS \$2⁵⁰ PROFIT \$27⁵⁰

That's what you make by transferring decalomania monograms on autos. Every motorist wants his car monogrammed. An artist charges \$5.00 and can't do as good work as you can do for \$1.50. No skill is required; no experience. Spare or all time. Circulars, full instructions, etc. free. Write for free samples—or send \$2.50 for outfit by return mail.

AMERICAN MONOGRAM CO.,
Dept. 183, East Orange, N. J.

SAMPLE FREE





"NOKORODE Soldering Salts is a friend of mine"

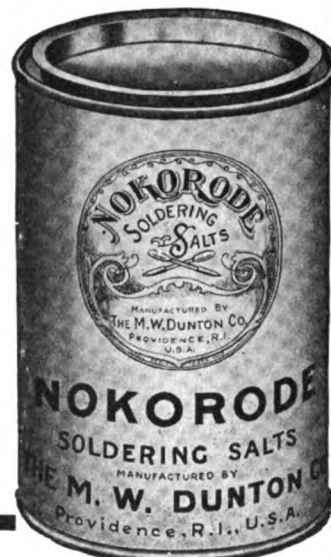
says the veteran mechanic. There is certainly great significance in the fact that thousands of repairmen, who have tried about every soldering preparation, now use nothing but NOKORODE.

There are several reasons why. When NOKORODE is used the job has to be done only once—it makes a secure, permanent bond. NOKORODE SALTS contains no acid and is absolutely non-corrosive and harmless to metals—also the worker. Cut with eight parts of water it will solder all metals and will not burn the mechanic's hands or clothing.

NOKORODE is used by the leading motor car and truck manufacturers.

To introduce NOKORODE in your shop we will send you a can on a money back guarantee. Send in the coupon today.

THE M. W. DUNTON CO.
Providence, R. I., U. S. A.



Place a trial order today

THE M. W. DUNTON CO.,
670 Eddy St.,
Providence, R. I.

Gentlemen:—

Enclosed find \$1.00 for which please send me a one-pound can of Nokorode Soldering Salts. It is understood that these Soldering Salts will satisfy me in every way, or you will refund my dollar.

Name

Address

INSTANSEAT seat Instantly PISTON RINGS

Dealers say—"It pays to handle INSTANSEAT rings because:

Customers desire *quick results*—
Preventing passage of excess oil
guarantees *against come-back jobs*—

Individual virgin grey iron castings
insure *good results after long usage*—
and because

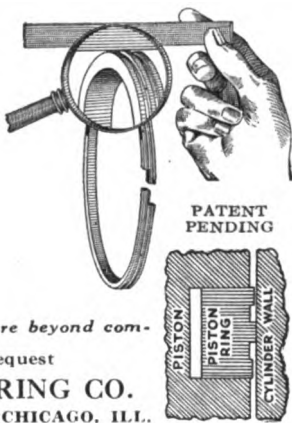
Quality, prices, and discounts are beyond comparison.

Sample ring mailed on request

KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL.



REPAIR SHOPS

**\$50 Starts You in the Business of
Repairing Scored Cylinders and
Cracked Water Jackets.**

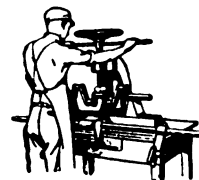
Start in this highly profitable business now by using the Bull Dog patented process and tool equipment for repairing scored cylinders and cracked water jackets without preheating or welding and make from \$8.00 to \$10.00 per hour. Write for our special proposition "D".

METALS REPAIR & SUPPLY CO., Inc.
1525 Fourteenth Street, N. W. Washington, D. C.

CONTINENTAL "The Efficiency Standard" SHOP EQUIPMENT

The
Continental Line

Motor Stand
Ford Engine Stand
Assembly Table
Welding Table
Battery Stand
Radiator Stand
Axle Stand
Creeper
Spindle Arm
Bushing Press
Crank and Camshaft
Straightening Press
Piston Vise
Riveting Jig
Piston Aligning Device
Parts and Tool Tray
Wrecking Truck
Burning-in Machine
Gear Pullers
Universal Straightening Press
Ford Assembly Table
Portable Work Bench
Propeller Stands



**Universal
Straightening
Press**

Designed for all kinds of straightening work, from factory requirements to garage and service station work. The dial indicator shows you to one-thousandth of an inch. It's a member of the Continental equipment family.

Write for catalogue of complete line.

**The Best Garages use
Continental Equipment**



CONTINENTAL AUTO PARTS COMPANY



Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

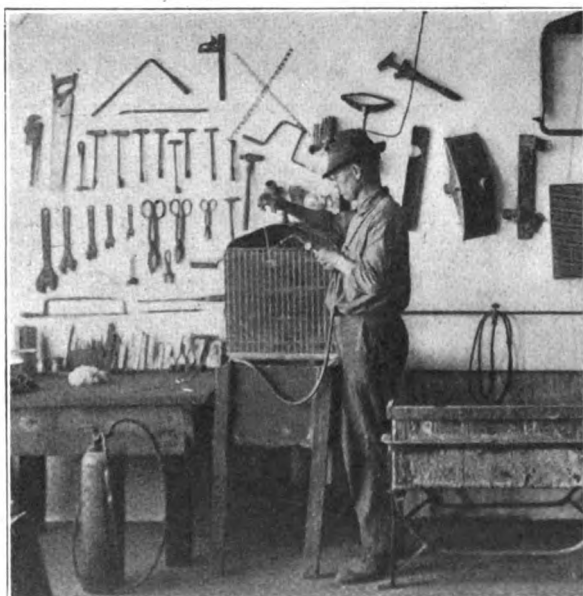
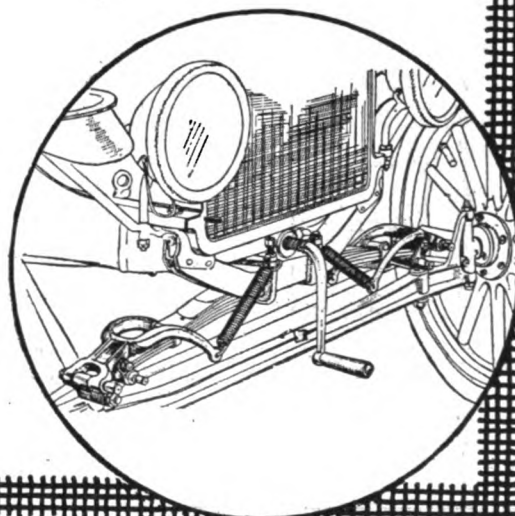
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



*"self-fluxing solder
is still more
effective."*

CLOYD OSBORN

A celebrated authority on soldering.

There is only one self-fluxing solder to be considered,
and that is



CHICAGO SOLDER CO.

4210 Wrightwood Ave.

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**FREE
Sample
Coupon**

CHICAGO SOLDER CO.
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Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder.

Name
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Address
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Our Supply House Is

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Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



Refacing Valves

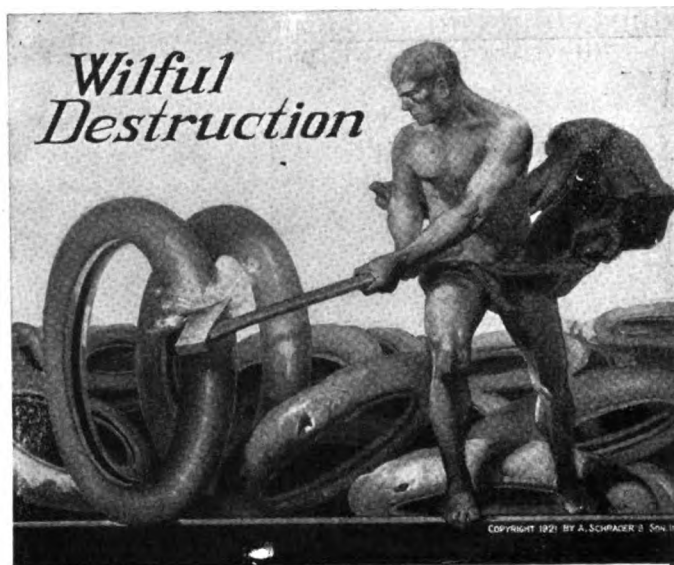
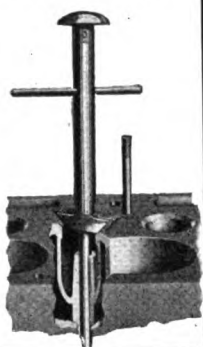
You can cut a true seating surface on a warped tungsten valve head in a few moments with the refacer included in the Skinner Motor Valve Set. Grinder speed and accuracy, at a hand tool price. Fits all valves.

Reseating

The reseater in the Skinner Motor Valve Set takes all valve seats up to $3\frac{1}{8}$ ". Each cutter will outlast many reamers. Pilots extra long. Entire set manufactured under highest machinist's standards.

Write for Skinner Motor Valve Set Bulletin

M. B. Skinner Co.
558-562 W. Washington Boul.
CHICAGO, ILL.



WE are running this picture with appropriate text in consumer publications of national circulation in order to impress upon millions of readers the **absolute necessity** of maintaining adequate and evenly balanced air pressure in their tires.

You can do your part in this campaign of education by telling your customers what **YOU** know about the costliness of under-inflation.

This will not only net you a profit on the sale of SCHRADER UNIVERSAL TIRE PRESSURE GAUGES, but will gain for you the good will of your customers.

A. SCHRADER'S SON, Inc.

Brooklyn, N. Y.

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Toronto

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KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by

THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.
Canadian Branch Factory at Woodstock, Ont.

The Tool You Have Been Looking For

The No. 1 Hot Baby Torch—a four in-one unit oxy-acetylene welding, cutting, lead-burning and decarbonizing torch with only one coupling to your tanks.

Costs no more than a lead-burning torch alone.

For further information write

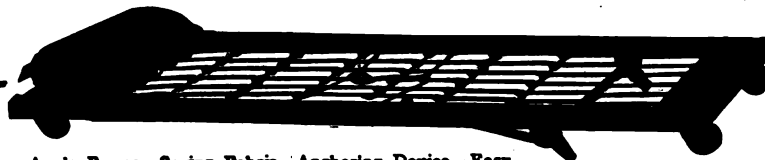
THE B. E. HICKEN SOD-TOR-LITE CO.

Dept. A

Prairie Hill, Missouri

Foster

Auto Repair Creeper
METAL CONSTRUCTION



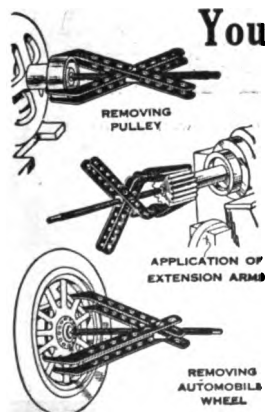
Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

FOSTER BROS. MFG. CO., UTICA, N. Y., U.S.A.

\$5.00

Ask for the name of the Foster distributor in your territory.

DIRECT REPRESENTATIVES
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You Need One or Both These Gear and Wheel Pullers

The "LITTLE GIANT"

pulls any gear, wheel or pulley—anywhere—in a jiffy. Built on the only correct principle—produces maximum efficiency with minimum effort. Can't twist off or let go. Made of best grade drop forge steel. Adjustable up to 13" diameter. Price complete with extension arms \$12. Satisfaction guaranteed or money refunded. Order one today or write for data.

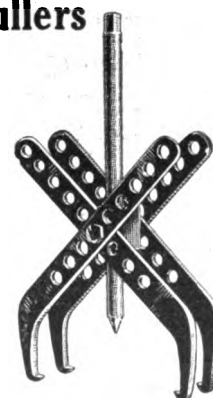
"THE HARDER THE PULL—THE TIGHTER THE GRIP"

Write for dealers' discounts and literature

Premier Electric Co., 3802 Ravenswood Ave., Chicago

"BIG BUSTER"

This heavy duty puller is designed to cover a range of work upward from where the "LITTLE GIANT" and other tools leave off. Weighs 100 lbs.—open adjustment 40". Pulls heavy motor truck and car wheels, ship and gear wheels, propellers, heavy fly and aeroplane transmissions, etc., easily. Can't slip off work—no arm locks required. Price complete with wrench and handle, \$50. Where you have a job no other puller will touch you need a "Big Buster."



Any Car is a Better Car with a Wickey Battery

**We want
Dealers —
to stop
Battery Grief**

—to do away with expensive "free" service. To sell the battery that does not need the care and attention that other batteries must have. You are invited to sell the most remarkable storage battery ever built: the

WICKEY Semi-Dry Rechargeable Storage Battery

You can make your business more profitable by selling Wickey Batteries, not more profitable from the standpoint of the original sale—but more profitable because after the sale there is no free service necessary.

Responsible business men who are alive to the possibilities of increased battery sales, increased profits, and greater customer's satisfaction are invited to write for full information. We have some desirable territory open for the right men.



Wickey Features

*Semi-dry: no acid or liquid to leak or spill.
Has no wall separators to give out.*

*Plates cannot buckle.
Needs water only 3 or 4 times a year.*

Will NOT freeze or overheat.

*Guaranteed three years.
Rechargeable from generator without removal from car when fully discharged.*

Write us today for complete details of our proposition to you for handling the Wickey Battery sales in your territory.

There is a Wickey Battery for every car — guaranteed for three years of service



WICKEY BATTERY CO.
730 Exchange Avenue
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This Big Dealer Says—

"Concentrate on
Rose Tire Pumps
and Your Pump
Business Will
Be Your Most
Profitable Line."



D. D. Troup
Troup Auto
Supply Co.
Omaha, Neb.

Frank Rose Mfg. Co.,
Hastings, Nebr.
Gentlemen:

During the past five years we have, at different times, attempted to handle no less than a dozen different tire pumps.

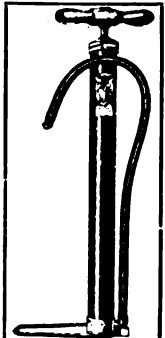
One year ago we decided to eliminate all pumps from our stock with the exception of the Rose Pump. Our reason for doing this was five-fold: First, the Rose is the best pump made; Second, it sells readily; Third, it stays sold; Fourth, it is a profitable line; and Fifth, it reduces our pump investment to a minimum.

If all dealers would concentrate their efforts on your pump we know from actual experience that their pump business would be the most profitable line they have.

We have had any number of customers ask us for a cheap pump, but with a little persuasion have had no difficulty in selling them a Rose Pump and we always feel that we have made a permanent, satisfied customer by doing so.

We cannot speak too highly of your pump and we expect to continue to sell Rose and only Rose Pumps as long as we sell pumps.

Troup Auto Supply Co.
By D. D. Troup.



LIST PRICE
1 1/4 in. \$2.50
1 1/2 in. \$3.00

FRANK ROSE MFG. CO., Hastings, Nebr.

Buffum Buick Valve Remover

In Your Shop

There is only one tool which will properly and easily lift the Buick valves from assembly. The Buffum Buick Valve Remover is positively indispensable in every shop that makes repairs on Buick cars. Quick, safe and sure in operation. Will not break valve cages, nor bend valve washers, springs or seats. Light, compact and easily handled.

If the Buick is to run as it should the valves must be cleaned from time to time—otherwise they become so fouled with carbon that they do not seat properly, resulting in lost compression and power. The Buffum Buick Valve Remover eliminates the hardest part of a cleaning job.

For Your Customers

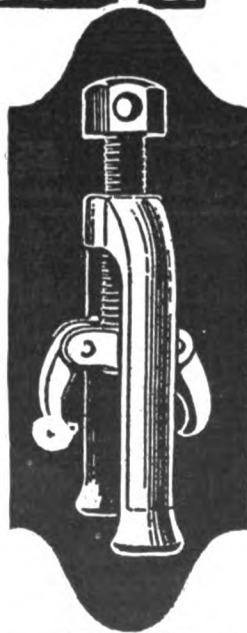
Every Buick owner can be easily induced to purchase one of these valve removers. He should have one with him at all times, especially when touring, as he might get broken down in the country where the local garage might ruin his valve cage.

Retail Price \$2.00. Fully guaranteed.

Write for trade prices.

BUFFUM TOOL CO.
Factory and General Offices

4th and N. Carolina Sts.
Louisiana, Mo., U. S. A.



BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



Set shown in illustration enjoys a well deserved popularity in the automotive field.

Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each.

Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

62 Reade Street

NEW YORK, N. Y.

11 South Clinton St., Chicago, Ill.

Announcing Two New Boe Grease Pump Buckets



Galvanized Iron, 30 lb. Capacity

Pump grease in or out of gear case, wash gear case out with kerosene, or dispense another consistency of gear lubricant with same pump if you like.

THREE WAY VALVELESS, with pump attached to bucket cover as shown, \$10 each.

TWO WAY SPECIAL, same valveless pump without quick detachable pump feature, \$5.75 each.

We also make a new Barrel Pump, same valveless construction for only \$10.

BOE MANUFACTURING COMPANY
Minneapolis, Minnesota

One Piece

TRADE MARK



PATENT PENDING

1000
Miles per
Gallon of
Oil
Positively
Guaranteed.

The Only Ring
with a Mileage
Guarantee.

Let us send you further particulars with prices

SAV-OIL PISTON RING CO.

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Chicago, Illinois

O'BRIEN HEAVY DUTY GREASE PUMP

**makes the handling of grease
SWIFT — CLEAN — EASY — SURE**

One man greases any differential or transmission in two or three minutes.

No grease is spilled on car, floor, hands or clothes. Delivers 1/2 pound per stroke. Indicator shows amount used.

Sold on money back guarantee.

Star Wing Co.

1406 S. Michigan Ave. Chicago



STAR GLASS WINDSHIELD WINGS

Clear, Amber and Green Glass—No Holes in Glass

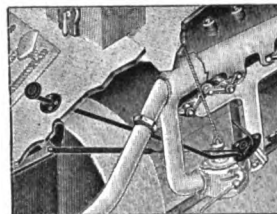
Successfully on the market over two years.

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Allows the driver to control the speed of his car entirely with his foot, leaving his hands free to operate the wheel, brakes and horn.

A convenience in the country
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Every Ford Owner a Buyer

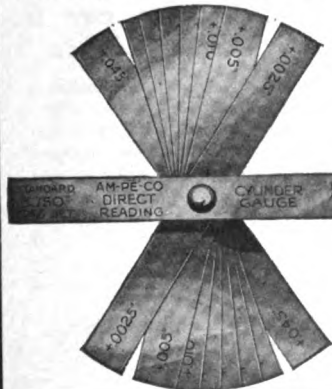
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ROMORT MFG. CO.
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Price 75c

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You Don't Guess the Answer You READ It on the Blade



Cylinder measurements guaranteed accurate to within .00025" and less.

The AM-PE-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

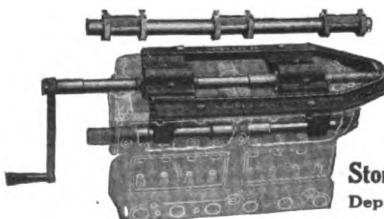
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installed in your garage will double your profits and give you a reputation for *quick, accurate* repairing.

The Storm Main Bearing Babbitting and Boring Tool



for Ford and Fordson Motors—puts in new, perfect bearings exactly the same as the original and in the proper position.

Write today for complete information

Storm Manufacturing Company
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The Garage *and* Shop Market Place

B-N *PISTON PINS* set the Standard
for *Hardness, Toughness, Roundness and Accuracy*

24-Hour Service From These Dealers—

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JOBBER — DEALERS!

Are you prepared to supply the demand for Trindl Piston Pins?

Trindl Piston Pins are the best pins you can buy. They are special heat treated which gives them a hard surface of about 1/32" in depth — accurately ground and tested to 1/10 of 1/1000th of an inch.

We carry an enormous stock of piston pins for all makes of motors, standard and oversize for immediate shipment. Specials on 24-hour notice. Quality, price and service makes us your most logical source of supply.

Send for Our Piston Pin Specifications and Price List.

The TRINDL CO. 2917 SO. WABASH AVE. CHICAGO

ANDRE G. CATELAIN
General Automobile Machine Work, Welding of All Metal—Authorized Ever Ready Battery Service Station—Sheet Metal Work—Manufacturer Catelain Hose Coupling—Sales and Service U. S. E. Shock Eliminators. 1446-8 Indiana Ave., Chicago, Ill.

**To Make 1922 a Big Year
Stock Accessories NOW**

CYLINDER REGRINDING

Standard and Oversize

PISTONS PISTON PINS
PISTON RINGS ALL WORK INSPECTED

With our **BU-NITE PISTONS**
Goes a **GUARANTEE**
of **SATISFACTION**

Standardized Prices
Material and Workmanship Guaranteed
Modern Equipment
Skilled Mechanics

Butler Manufacturing Co.
Established 1897 **INDIANAPOLIS, IND.**

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HOPLAND, CALIFORNIA

W. A. MORRISON, Proprietor

Auto Supplies, Tires, Tubes
Gasoline, Oil and Free Air

BATTERY SERVICE STANDARD PRICES

Reboring, Acetylene Welding, etc.
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PHONE 172

FOR SALE

ESTABLISHED AND GOOD PAYING
auto accessory and garage business, great opportunity for expansion—available space for enlarging. Reason for selling—business expanding too fast, age and ill health.

R. C. Longbothum, Mansfield, Pa.

WANTED

High grade salesman to call on the jobbers of the country with a high grade line of All Steel Bodies for trucks and Ford roadsters.

The N. G. V. Company, Gallon, Ohio

Charges all Magnetos,
Charges all Ford Trucks,
Tractors in the car in
ten minutes time.

Installed on any alternating line. Has a high grade tester. Can adjust Amperes from 10 to 35 Amps. Special price on first machine sold to Counties where there is no Distributor. State Distributors wanted for Ill., Iowa, Mo., Kan. For prices of machines, territory contracts, blanks, complete information address

L. D. KILBOURN
New Hartford, N. Y.

Guaranteed Repairs and Replacements—Any Make or Type Magneto--Generator--Starter DISTRIBUTORS—JOBBER

Briggs and Stratton Co.—Basco Cutouts—Switches—Panels. Connecticut Ignition—Atwater-Kent Ignition—
Lighting—Starting. Link-Belt Silent Chains. National Carbon Company—Pyramid Brushes. Eclipse
Machine Company—Bendix Drives and Parts. Ray Storage Batteries—Guaranteed Unconditionally Two Years.
Official Service Station: Bosch Magnetos—Starting and Lighting Systems.
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Authorized Dealer Delco-Remy Starting—Lighting—Ignition

SERVICE BY THE GOLDEN RULE

SAMPSON ELECTRIC COMPANY

— STARTING — LIGHTING — IGNITION —
2334 — 36 SO. WABASH AVENUE, CHICAGO

"PRO-TEX-OIL" THE MIRACLE LUBRICANT

FOR FORD CARS and FORD TRUCKS

"PRO-TEX-OIL" is a high grade, natural, rich automobile oil, refined from Pennsylvania Crude, manufactured and compounded in such a way as to permit it to retain a larger percentage of lubricating fat than through the ordinary refining process. Through the process in which we manufacture this oil, it retains its natural lubricating fat which greatly improves the lubricating qualities and accomplishes its most important object which is THE ABSOLUTE ELIMINATION OF CHATTERING in Ford cars and Ford trucks.

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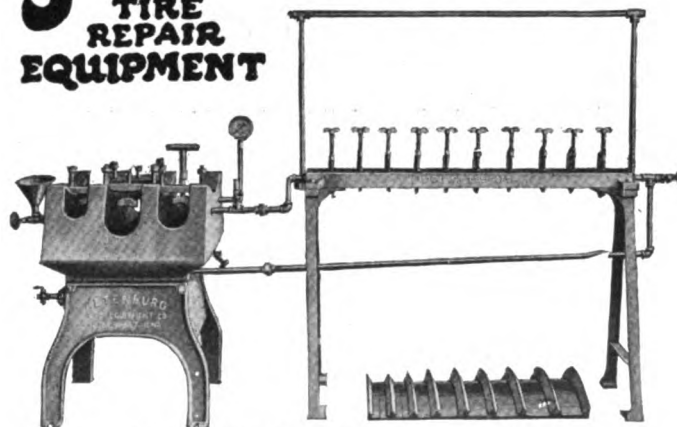
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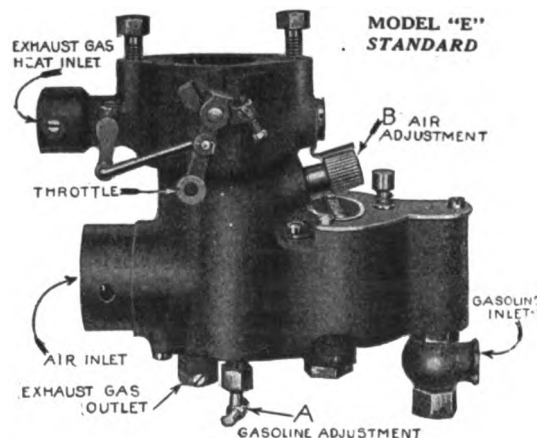
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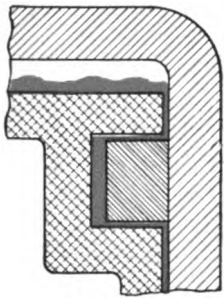
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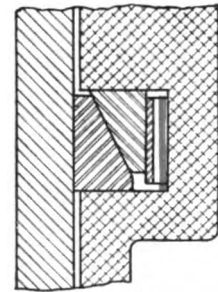
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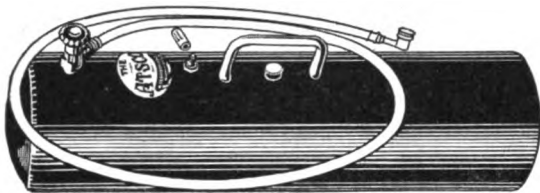
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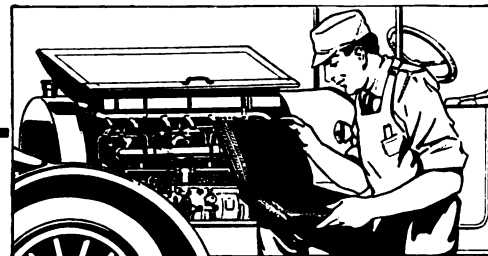


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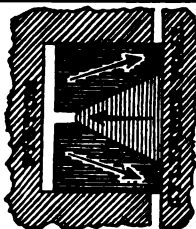
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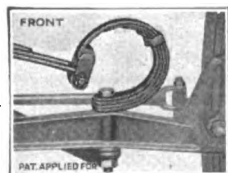
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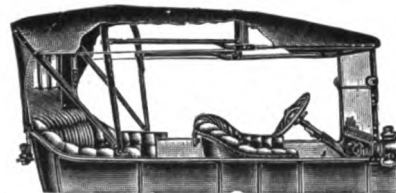
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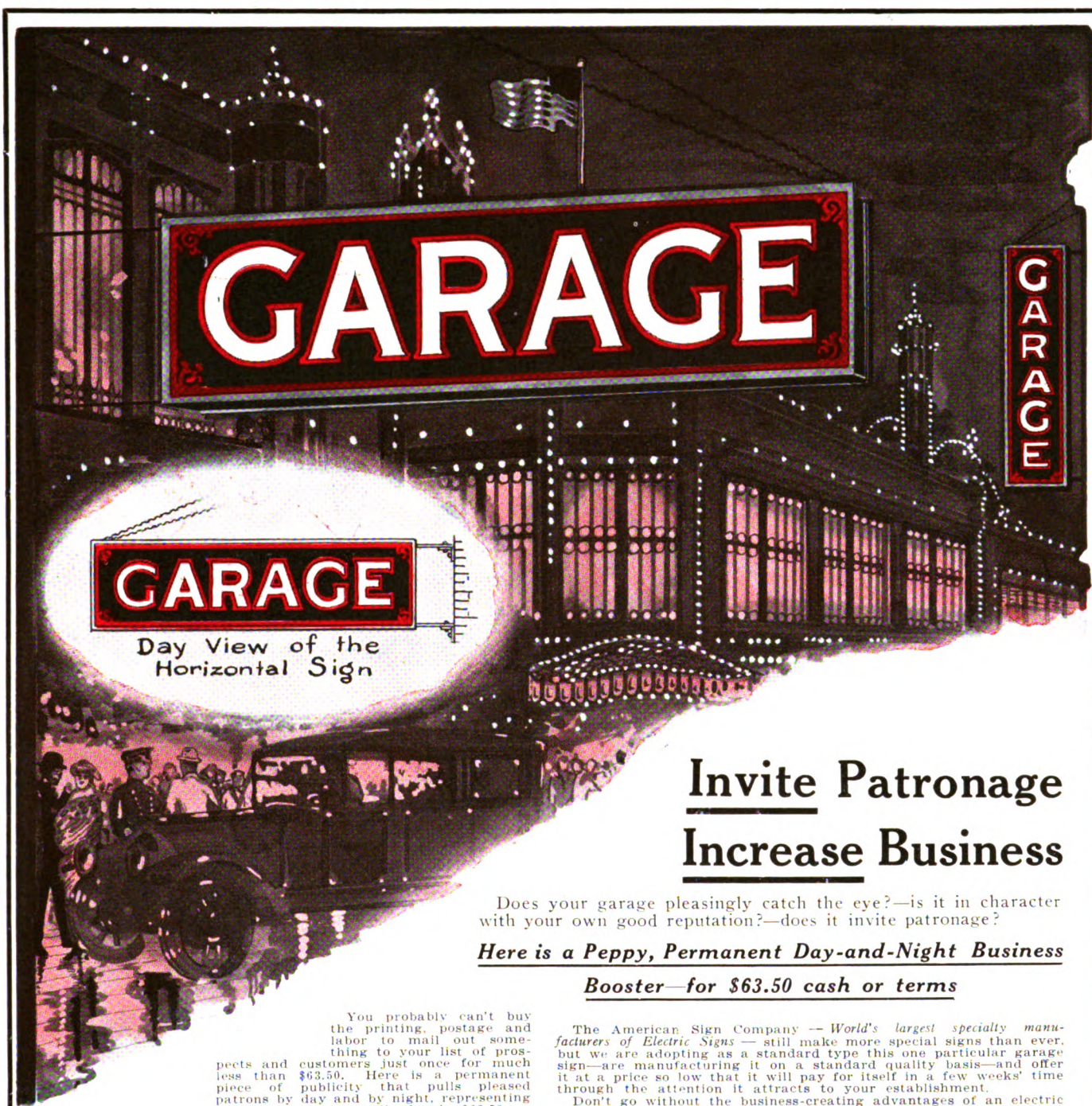
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- SPRING OILERS**
Reliance Automotive Devices, 243 W. 55th St., New York.
- SPRING LEAF LUBRICATORS**
Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.
- TURNER MFG. CO., KOKOMO, IND.**
- SPRINGS**
Garden City Spring Works, 2300 Archer Ave., Chicago.
New Era Spring and Specialty Co., Grand Rapids, Mich.
- STORAGE BATTERY TESTERS**
Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.
- TAPS AND DIES**
Butterfield & Co., 63 Reade St., New York.
- TESTING INSTRUMENTS**
Leich Electric Co., Genoa, Ill.
- TIMERS**
Dale Mfg. Co., 1323 S. Michigan Ave., Chicago.
Leich Electric Co., Genoa, Ill.
Spad Mfg. Co., Inc., 42-B W. 39th St., New York City.
Turner Mfg. Co., Kokomo, Ind.
- TIRES**
Geo. K. Culp, Inc., 56 W. 45th St., New York.
Broadway Tire Jobbers, 250 W. 54th St., New York City.
- TIRE CARRIERS**
International Stamping Co., 400 N. Leavitt St., Chicago, Ill.
New Era Spring & Specialty Co., Grand Rapids, Mich.
- TIRE REPAIR EQUIPMENT**
Robt. M. Bowes Co., Indianapolis, Ind.
Atlas Auto Supply Co., 680 W. Austin Ave., Chicago, Ill.
Sears Tire Equipment Co., Davenport, Iowa.
C. A. Shaler Co., Waupun, Wis.
- TOP CONVERTERS**
Precision Metal Workers, 3100 Carroll Ave., Chicago.
- TOW LINES**
Hooven-Allison Co., Xenia, Ohio.
- TRAFFIC SIGNALS**
Precision Metal Workers, 3100 Carroll Ave., Chicago.
- TROLLEYS**
Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.
- TRUSSES (FOR GARAGES)**
Leo McDaniel Contracting and Engineering Co., Cairo, Ill.
- TUBES**
Broadway Tire Jobbers, 250 W. 54th St., New York City.
- VALVE CUTTERS AND REFACERS**
M. B. Skinner Co., 562-562 Washington Blvd., Chicago.
- VALVES**
Romort Mfg. Co., Oakfield, Wis.
A. Schrader's Son, Inc., 788-793 Atlantic Ave., Brooklyn, N. Y.
- VALVE CAPS**
A. Schrader's Son, Inc., Brooklyn, N. Y.
- VALVE GRINDERS**
Albertson & Co., Sioux City, Iowa.
- VALVE REMOVERS**
Buffum Tool Co., Louisiana, Mo.
- VAPORIZERS**
Horgan-Cavanaugh Co., 933 Washington Blvd., Chicago.
- VISORS**
New Era Spring & Specialty Co., Grand Rapids, Mich.
- VOLTMETERS (POCKET and DASH)**
Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.
- VULCANIZERS**
C. A. Shaler Co., 353 Fourth St., Waupun, Wis.
- WATER CIRCULATING PUMPS**
Reliance Automotive Devices, 243 W. 55th St., New York.
- WELDING EQUIPMENT**
F. A. Albertus & Co., 206 9th St., Milwaukee, Wis.
St. Paul Welding & Mfg. Co., 165 W. 3rd St., St. Paul, Minn.
- WINDSHIELD WINGS**
Star Wing Co., 170 W. Randolph St., Chicago.
- WORK BENCHES (Portable)**
Continental Auto Parts Co., Columbus, Ind.



GARAGE

Day View of the
Horizontal Sign

Invite Patronage Increase Business

Does your garage pleasingly catch the eye?—is it in character with your own good reputation?—does it invite patronage?

Here is a Peppy, Permanent Day-and-Night Business

Booster—for \$63.50 cash or terms

You probably can't buy the printing, postage and labor to mail out something to your list of prospects and customers just once for much less than \$63.50. Here is a permanent piece of publicity that pulls pleased patrons by day and by night, representing an investment by mail of only \$63.50.

It is our **GARAGE SPECIAL** American Opal Glass Letter Sign. Designed to catch the eye—invite patronage—increase business.

Construction and Specifications Point the Way to Big Sign Value

This "Garage Special" is made with galvanized sheet steel faces with heavy gauge filler to which the faces are durably fastened by our exclusive welding and folding processes. This Garage special sign in the horizontal shape is 7 feet long, 2 feet wide and 7 inches thick and contains 14 sockets requiring 25-watt lamps. In the vertical shape it is 9 feet high and contains 18 sockets requiring 25-watt lamps. The sign is completely wired to comply with requirements of the National Board of Fire Underwriters.

The letters are 12 inches high and are outlined as illustrated in vivid color. The frame finish is three coats of flexible oven baked black enamel, the background being weather proof gloss black.

The combination of black background, creamy white lettering and red outline gives you one of the most effective signs in its class ever offered and with a 100% reading strength. Each sign is furnished complete with the necessary material for hanging. You may have your choice of either horizontal or vertical, but the vertical shape being 2 feet longer than the horizontal costs \$10.00 additional or \$73.50—both signs are of the same general construction except that the lettering and fittings are planned either for vertical or horizontal position. Day and night views of the horizontal sign are shown above and night view of the vertical sign.

The American Sign Company — *World's largest specialty manufacturers of Electric Signs* — still make more special signs than ever, but we are adopting as a standard type this one particular garage sign—are manufacturing it on a standard quality basis—and offer it at a price so low that it will pay for itself in a few weeks' time through the attention it attracts to your establishment.

Don't go without the business-creating advantages of an electric sign when you can own one of these high grade opal glass letter American signs for the low mail order price of \$63.50.

THE AMERICAN SIGN COMPANY
Kalamazoo, Michigan

MAIL ORDER SAVINGS BLANK

The American Sign Co.,
Kalamazoo, Michigan

Date.....

Gentlemen:—

Attached find remittance for \$13.50. Ship at once one American Garage Special Sign as described, on following basis:

☐ Cash basis. \$13.50 herewith, balance when sign is received, less 5% cash discount on full amount.

☐ Monthly payment basis. \$13.50 herewith, \$10.00 each month until the total amount has been paid.

(If I accept the monthly payment terms, I agree to sign monthly notes of \$10.00 each which you are to send to me for signature when the sign is shipped).

Send the following style:

☐ Horizontal, total price \$63.50.

☐ Vertical, total price \$73.50.

Make shipment to

Personal Name

Firm Name

City

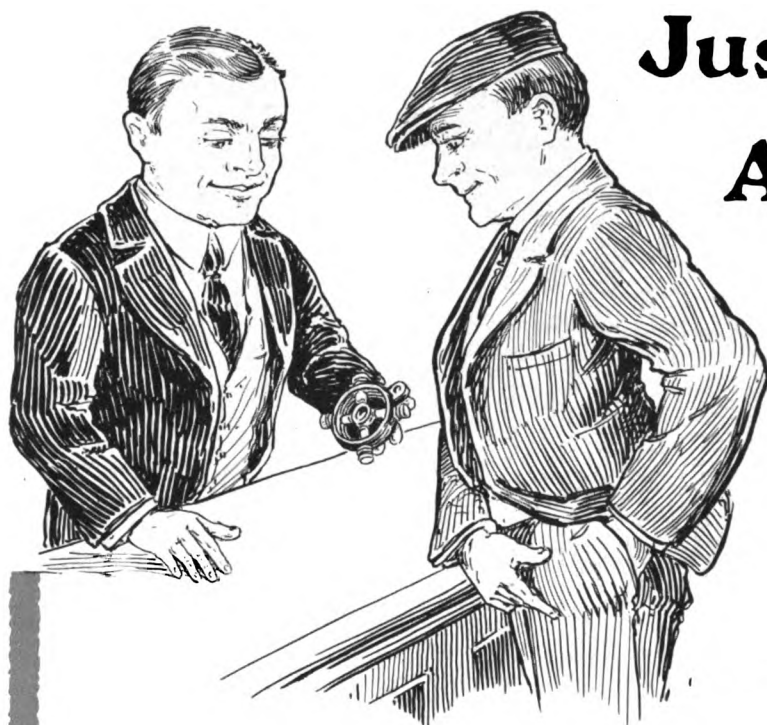
State

Don't "Ask 'Em To Buy"

Just Show 'Em—

A DALECO

Trade Mark Registered



They'll Buy

Ford car owners are tired of buying trouble and annoyance via cheap timers, or paying inflated prices for complication and claimed but invisible quality.

They want value they can see and a guarantee that means service.

The Quality of the DALECO Timer is based on material, design and workmanship that is instantly seen and appreciated by every car owner and needs no explanation or selling argument.

Just show it and it will sell itself.

The Bakelite Case, absolutely shortproof; All Copper and Brass metal parts, machined from solid stock, and Wipe Contact, speak for themselves and the Guarantee bond packed with every DALECO timer clinches the sale.

Easy and Quick sales mean good profits and satisfied customers become boosters and send more buyers.

A word to the wise dealer is sufficient. If you do not sell the DALECO just order a sample from your Jobber and you will.

Why delay?

Manufactured by
DALE MANUFACTURING CO.

1323 Michigan Ave.
CHICAGO, ILLINOIS

Sales Department
THE ZINKE COMPANY

1329 Michigan Ave.
CHICAGO, ILLINOIS

The Quickest Seating Piston Ring



Patents Pending

45^{cts} each

Made from a special grade of tough, white cast iron, peened by a special process and coated on the face with zinc to a thickness of $\frac{2}{1000}$ of an inch, they wear to a perfect fit in less than an hour, simultaneously filling up any small scratches and porosities in the cylinder walls, thus glazing the surface and greatly retarding the ultimate wear.

Balance of surface has a protective coating of zinc $\frac{1}{30}$ of $\frac{1}{1000}$ of an inch thick. They do not shopwear, they do not rust.

ZELCOS ARE THE FINAL ANSWER TO THE ONE-PIECE PISTON RING PROBLEM.

Made either mitre or step-cut. Write for particulars.

Our dealers proposition is a winner

ZELCO PISTON RING DIVISION

(Walter A. Zelnicker Supply Co.)

ST. LOUIS

(Wellston District)

SPEE-DEE'S *Many* Uses

**assure generous consumption
and rapid repeat sales**



One of the biggest advantages of handling SPEE-DEE is the **volume** of business that can be done on a small outlay.

SPEE-DEE excels for so many purposes that a can is soon consumed and the user is back for another.

Car owners, drivers and mechanics appreciate the quick and thorough cleansing of the hands with SPEE-DEE. No water is needed—and it contains no grit, lye or acid to injure the skin. Invaluable for this purpose in cold weather or after making a roadside repair. SPEE-DEE is unequalled for cleaning seat covers and celluloid side curtains.

In the home SPEE-DEE has numberless uses including cleaning rugs, carpets, woodwork, walls and clothes. Takes much of the drudgery out of wash day or housecleaning time.

Our Great National Advertising Campaign

soon to start in 2600 newspapers combined with the Saturday Evening Post and Literary Digest will make the public familiar with the various uses of SPEE-DEE.

The demand thus created means profitable and permanent business for every dealer who is willing to cash in on it.

Stock SPEE-DEE **now**. Write or wire for special introductory offer and dealer selling helps.

STATES CHEMICAL CO.

680 W. Austin Ave.

CHICAGO



American Garage & Auto Dealer

Published Monthly
118 So. Michigan Ave.
CHICAGO, ILL.

APRIL, 1922

Vol. 13—No. 4.
10 Cents the Copy.
\$1.00 Per Year.



A Friend in Need

Over a million motorists carry the simple Shaler Vulcanizer for emergency use in making quick, permanent tube repairs—at home or on the road. It is the greatest convenience ever invented for the motorist.

The Best Selling Accessory

Every demonstration makes a sale—because every motorist wants the Shaler 5 Minute Vulcanizer, just as soon as he sees how easy it is to make quick, permanent tube repairs with it. Every sale makes a steady customer for you, as every user will come back for extra Patch & Heat Units to use with his Shaler. Each sale brings a chain of sales on which you make a good profit every month in the year.

ALL JOBBERS SELL IT—WRITE FOR WINDOW DISPLAY

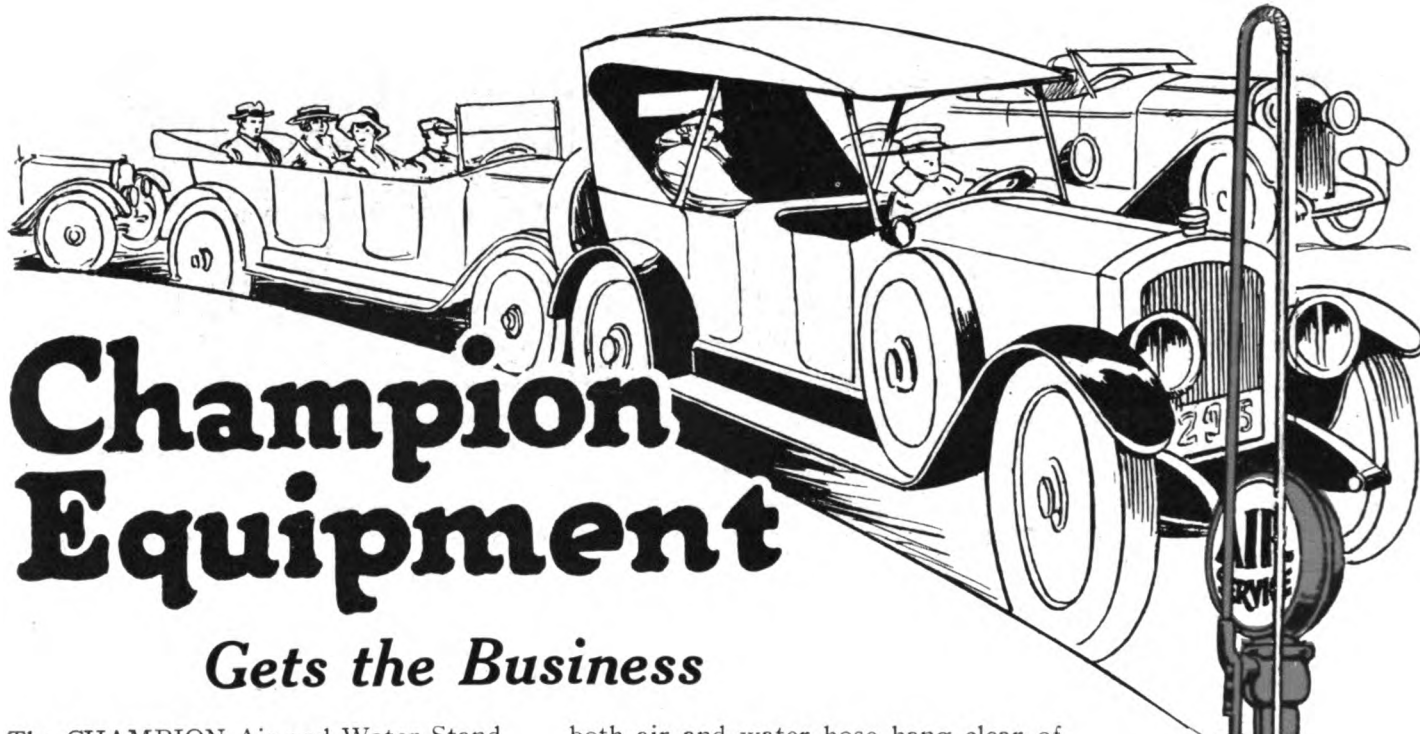
The Shaler 5 Minute Vulcanizer also repairs rubbers, rubber boots, hot water bottles, rubber gloves, coats, etc.

The Complete Outfit includes the vulcanizer and 12 Patch & Heat Units (6 round for punctures and 6 oblong for cuts) and retails for \$1.50—except west of the Rockies and in Canada. Extra Patch & Heat Units retail for 75 cents a dozen. Write now—for our new Window Display, Counter Display, Circulars and other Dealers' Sales Helps—Dealers' Discounts, etc.

C. A. SHALER CO.
353 Fourth St., Waupun, Wisconsin

The Shaler has not only made vulcanizing simpler, and decidedly cheaper, but is automatic in action and so easy to use that any motorist can make perfect, heat vulcanized tube repairs with it, anywhere on the road, in 5 minutes. It saves time, prevents delays, makes tubes last longer. The Shaler makes a strong, durable, permanent tube repair that can't come off—stronger than the tube itself. It's easier than sticking on a temporary cold patch—quicker than changing tubes.





Champion Equipment

Gets the Business

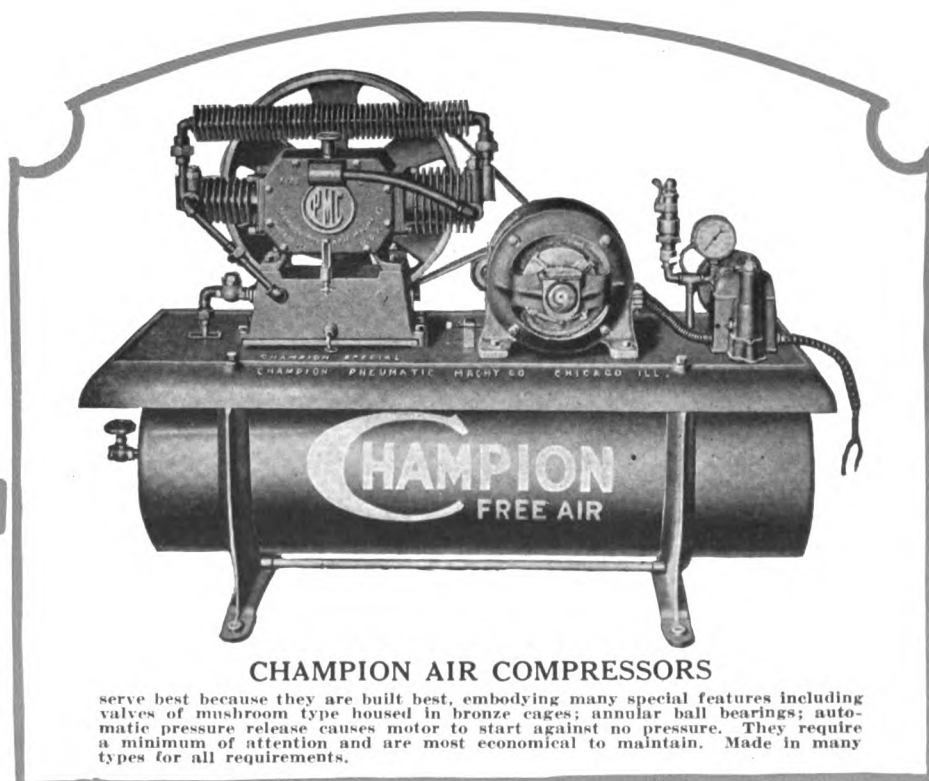
The CHAMPION Air and Water Stand is a winner. Motorists are attracted to service and filling stations having this stand because of its dignified, striking appearance. They are immediately reminded of the need of air and water and a new customer is made for other purchases. The CHAMPION is clean, as

both air and water hose hang clear of ground when not in use. All tires and the radiator can be filled without moving the car, and arm automatically returns to vertical position when user releases hose. No interference with traffic when the CHAMPION is installed.

Write today for literature

CHAMPION PNEUMATIC MACHINERY CO.

1400 S. Michigan Avenue, Chicago



CHAMPION AIR COMPRESSORS

serve best because they are built best, embodying many special features including valves of mushroom type housed in bronze cages; annular ball bearings; automatic pressure release causes motor to start against no pressure. They require a minimum of attention and are most economical to maintain. Made in many types for all requirements.

Don't Let Profits Escape

Know Your Costs as You Work

Comfort's Repair Order accounts for all repair operations, is simple, accurate, easy to keep and speedy in handling. Yet it gives you all the information you want and—no more. Like all Comfort's forms, it is strictly adapted to the automotive business and is void of red tape. Practical garage knowledge is in every word of it.

Profits will never escape the user of this form, because *always* he has a minute knowledge of costs. After the finished job is delivered he will never get into disputes with customers about what was ordered and what not because *the customer signs the repair order before a hand is lifted*. Thus the repair order virtually becomes a legal contract.

The Repair Order is in triplicate form. The first sheet is the office copy. The repair order is written on it. The second sheet is the invoice, or customer's copy. The third sheet is an instruction card. All sheets are made with one writing, carbons are provided for this.

All Prices
F. O. B. Your City

PRICES

| | | | |
|----------|---------|-----------|---------|
| 100..... | \$ 3.00 | 1000..... | \$18.00 |
| 250..... | 6.00 | 2500..... | 40.00 |
| 500..... | 11.00 | 5000..... | 72.00 |

Imprinting name and address
\$3.00 per thousand extra.

"We have tried to use other forms, thinking they would do as well, but have determined upon the forms furnished by your company. The repair order blanks, used in our shop, are especially adapted for that use. The workmen do more efficient work. We keep track of everything used on the car. When the job is finished the customer has an accurate account of the operations and the parts used. No automobile concern will make a mistake in installing these forms."

BARNETT MOTOR AGENCY,
Carrollton, Illinois.

We have buyers in every state in the Union and in ten foreign countries.

COMFORT
Printing Specialty Company
109 North Eighth St., St. Louis, Mo.

COMFORT PRINTING SPECIALTY CO.,
109 No. Eighth St., St. Louis

Please ship us Triplicate Repair Order. Enclose find check for \$.....

Name

Address

City State



Every Motorist Carries a Spare Tire
Wise Ones Carry—

2-R-3

**2
R
3
TIRE
CARRIER**

THE handiest, most convenient and in every way the Most Satisfactory Device ever made for carrying extra spare tires.

Just hang the 2-R-3 Carrier on the original spare, then set the extra in the cradle and strap them all together.

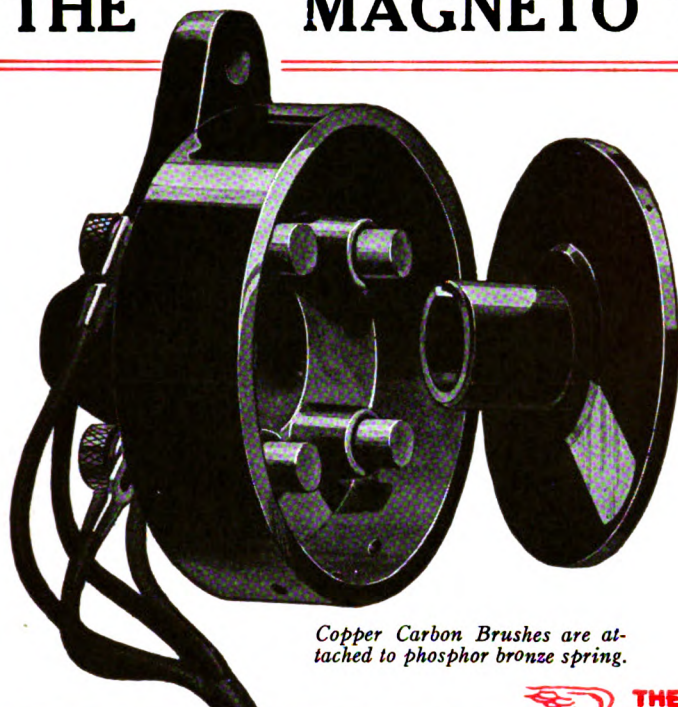
If you want to carry three or more spares just hang another 2-R-3 Carrier on the preceding spare and support the third in the same manner as the second.

Easily Attached and Quickly Removed.

A Boon to the Motorist—A Quick Seller for the Dealer and Profitable and Satisfactory to both.

International Stamping Company
402 North Leavitt St., Chicago

THE MAGNETO TIMER FOR FORDS



Copper Carbon Brushes are attached to phosphor bronze spring.

4 Live Reasons

Why Spad Timers Are The Best

1. **Absolute freedom from oil** assures a hotter spark. The brushes are extended away from any possible contact with oil.
2. **Not affected by a wobbly cam-shaft.** The rotor is a flat disc having no moving parts such as the customary brush and roller. This assures freedom from wear caused by a wobbly cam-shaft.
3. **Unique construction assures long life.** The average life of the brushes and rotor—the only wearing parts—is over one year. The shell, the most expensive unit, lasts forever. Brushes are easily replaced.
4. **Similar in construction to Magneto Distributor.** Both units being made of high grade insulating material makes short circuiting impossible. Ideal contact is made between phosphor bronze segment in rotor and copper carbon brushes in shell.

Unusually attractive dealers and distributors discounts.

SPAD MANUFACTURING CO.

INC.

42-B West 39th Street

NEW YORK



LIST PRICE IN U. S. A., \$2.50
formerly \$4.00. West of Rockies,
\$2.75. Canada, \$3.75.

REPEAT ORDERS PUT THE CHIEF AUTO MIRROR OVER

Every dealer, jobber and car distributor who is selling this Quality Mirror has come back for more—so will you.

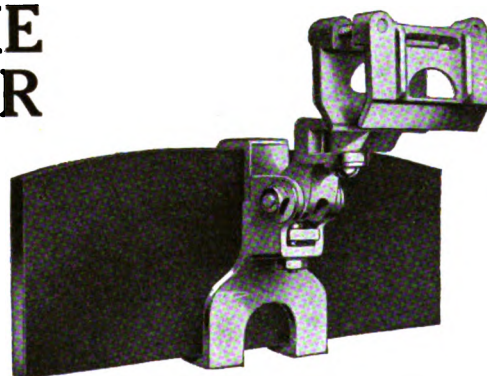
The Chief Auto Mirror stays sold on its merits. Carefully constructed and finished like a piece of jewelry, it sells on appearance as well as utility. The mirror is the finest quality French crystal with the silvering protected against the elements by a patented chemical process.



This trade mark protects the dealer against substitution and guarantees the Chief to the owner.

Chief Mirror brackets can be easily adjusted to any angle and stay put. Every bracket is interchangeable.

JOBBERs and DEALERs are enthusiastic over the sales possibilities of this wonderfully attractive line of mirrors. If you haven't received a copy of our catalogue write for it now. We will supply direct all dealers whose jobbers do not carry the line.



Model A—Style No. 1—Oval, 8 x 2 3/4"
Made especially to fit the center windshield frame of all touring and open cars. Faces the driver for rear or side views. Reversible with windshield open or closed or top up or down. The lock-clamp will fit any universal windshield frame, oval, round or square, and holds securely.

Price, \$5.00

BRITTON AUTO PRODUCTS CO., Inc.

118 West 63rd St.

New York City

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, *Editor*

Contents

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| "Fact Service" Does \$80,000 Business | 9-10 | Construction of Pneumatic Tires | 22-23-24 |
| Raymond M. Foley tells an interesting story of a Michigan dealer who started business a few years ago in a corner of an oil and gasoline station and now averages over \$80,000 yearly because he insisted upon giving "fact" service | | H. J. White and Lowell R. Butcher present the second of the series of articles on "Tire Repair and Vulcanizing," discussing tire construction and nomenclature. | |
| "You Tear 'Em Up; We'll Drag 'Em In" | 11 | How to Repair the Leaky Containers | 25-26 |
| "And," says Ruel McDaniel, "that's just what the Standard Motor Car Co., of Pensacola, Fla., did, thus building good-will and good business through the gratitude of motorists rescued by its 'automobile ambulance.'" | | Gustav H. Radebaugh writes of approved methods for repairing leaky containers and describes soldering methods and preparations. | |
| Accounting | 12-13 | Welding, Cutting and Brazing Practice | 27-28 |
| If you are one of the garagemen who have believed that there is no profit in gasoline sales, you will be interested in this article by J. Newton Boddy, C. P. A., (N. A.) which tells how the handling of gasoline may be made profitable. | | David Baxter tells of importance to the welding shop of a suitable preheating system and describes several preheating devices which the welder can make for himself. | |
| Tourist Season Near—Are You Ready? | 14 | Why Not Use the Wasted Light? | 30-32 |
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| Do You "Ask 'Em to Buy?" | 19 | Here and There in the Motor World | 44-46 |
| The garageman in J. N. Bagley's story didn't until he was reminded—now he is selling the goods. Have you ever tried offering your employees a sales bonus as a means of increasing sales? It has been found effective. | | Tells of happenings concerning the automotive industry in various parts of the country. | |
| Operation of the Electrical Units | 20-21 | Accessories—Dealers' Key to Profits | 48-50 |
| J. R. Bayston presents the first of a series of articles which will discuss the principles of construction and operation of the various units of automotive electric systems. | | Now is the time dealers want to stock accessories for the coming season. You will find many new accessories of interest described in these pages. | |
| | | Up-to-the-Minute Garage Equipment | 52-54-56 |
| | | Upon the efficiency of your equipment depends, to a large extent, the success of your business. Many new and practical garage tools are described and illustrated in this department. | |

AMERICAN GARAGE & AUTO DEALER, Inc.

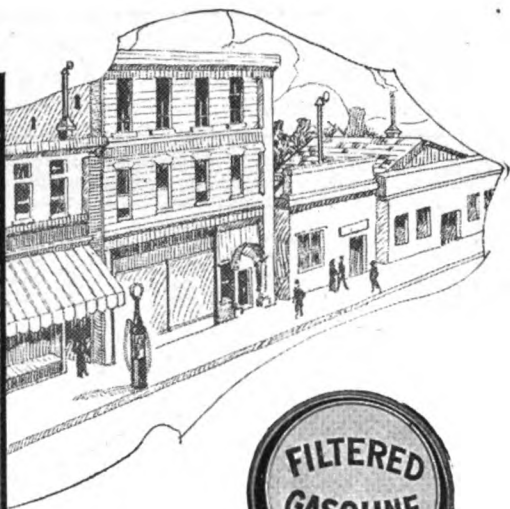
116 South Michigan Avenue, CHICAGO

J. R. HASTIE, president and treasurer. E. C. HOLE, vice-president.
H. D. FARGO, vice-president. R. S. CLISSOLD, vice-president.
S. R. EDWARDS, secretary.

A. H. GREENER, Manager, New York Office, 116 W. 39th St., New York, N. Y.
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A. Q. GORDON, Manager, Cincinnati Office, 57 Atlas Bank Bldg., Cincinnati, Ohio
WALTER C. ORR, Manager, Cleveland Office, 422 Prospect Bldg., Cleveland, Ohio
H. D. FARGO, JR., Manager, Chicago Office, 116 S. Michigan Ave., Chicago, Ill.

The subscription price of AMERICAN GARAGE & AUTO DEALER is \$1 per year (U. S. and possessions); Canadian and Foreign, \$1.50 per year. Single copies, U. S. A., 10 cents.

Postoffice Entry—Entered as Second Class Matter March 1, 1916, at the Post Office at Chicago, Illinois, under the Act of March 1, 1879.



Selling more service with the aid of a pump

Ever stop to consider how a curb gasoline pump can help increase the amount of service work which you do? Here is the way it works out.

A gasoline pump on the curb in front of your repair shop or garage will stop its share of passing motorists. While you, or one of your assistants, are filling an automobilist's tank, ask a few questions about the car.

It may need some minor adjustments which you can make while the driver waits. And by showing an interest in the motorist and his car you will make a friend who will bring his car to your shop when repairs must be made.

The sales on gasoline alone will more than take care of the investment on the pump. And the profits which you will make on new work will be just so much extra money for you.

Wayne Honest Measure Pumps attract trade. They serve the automobilist quickly, giving him the exact quantity of filtered, water-free gasoline which he pays for.

Most motorists know this. And many more are learning it from our national advertising and from their own satisfactory experiences with Wayne Honest Measure Curb Gasoline Pumps.

When you write, ask for Bulletin 276-AGD

Wayne Tank & Pump Company

774 Canal Street,

FORT WAYNE, IND.

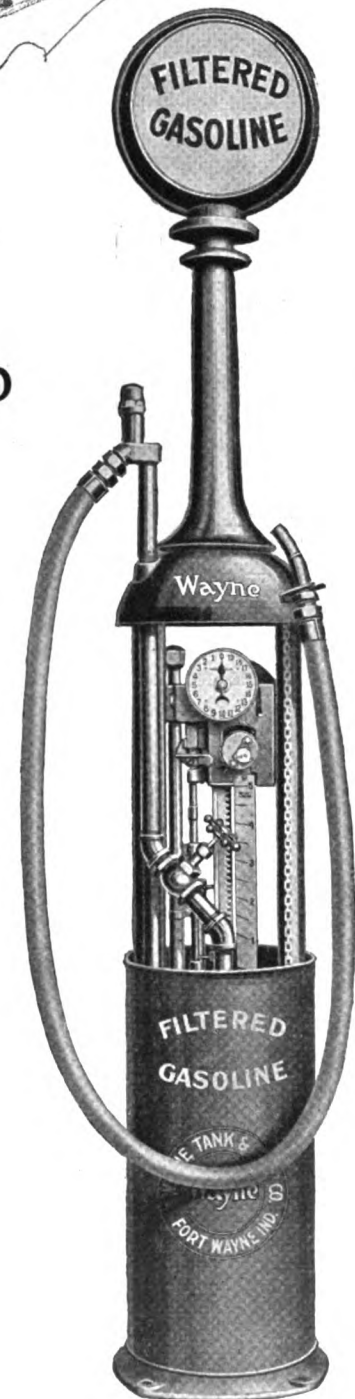
San Francisco Office: 631-633 Howard Street.

Canadian Tank & Pump Co. Ltd., Toronto, Ont.

An International Organization With Sales and Service Offices Everywhere

REG. U. S.
Wayne
TRADE MARK

HONEST MEASURE PUMPS



FIVE-GALLON PUMP. (Cut 276.)

Gasoline and Oil
Storage Systems

Heavy Metal
Storage Tanks

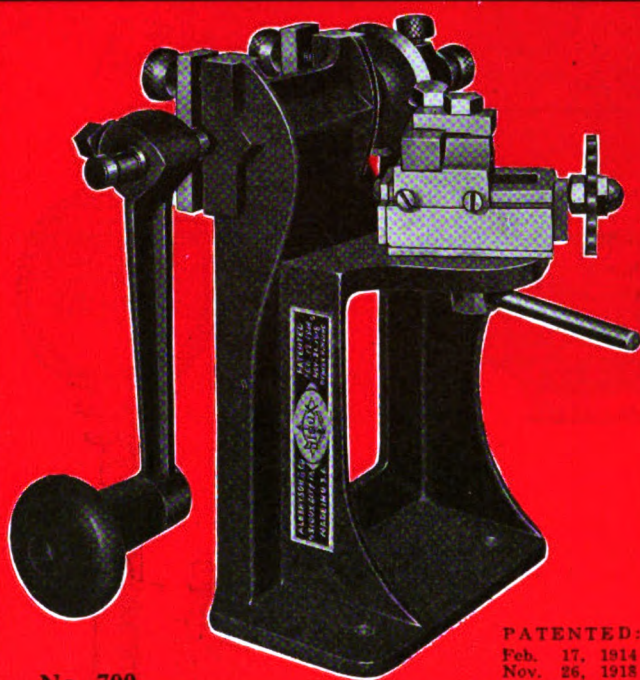
Air
Compressors

Water Softening
Systems

Oil Filtration
Systems

Oil Burning Systems
Furnaces and Forges

"LITTLE SIOUX" VALVE LATHE



No. 700

PATENTED:
Feb. 17, 1914
Nov. 26, 1918
Others pending

Fills a Need in Every Garage

Refaces valves of any size up to 2½ inches. Is simple, self adjusting and absolutely accurate. Even a novice can operate it. Fits in a vise or can be permanently attached to a bench.

Does a perfect job and requires only a few turns of the handle.

Cuts Hardest Steel Valves. No valve is too hard to be cut with a Little Sioux Valve Lathe. It is particularly adapted for cutting Tungsten Steel Valves.

Circular Cutter provides unlimited cutting edges and has ten times the life of an ordinary cutter. Insures a smooth, even face on valve. Leaves no ridges. Made of special alloy of extraordinary hardness and will stay sharp a long time.

Graduation Plate. Has angles 30, 45, and 60 degrees plainly etched on it. Accurately adjusted by simple loosening clamp, moving adjustment lever to proper degree and setting clamp again. Closing lever keeps cutter in accurate line.

Tool Holder is adjustable in or out. No up and down adjustments. Cutter cannot get out of cutting line with valve.

Center Adjustment has positive stop and keeps valves centered while refacing them. When set for certain sized valve it will always be centered for same sized valve.

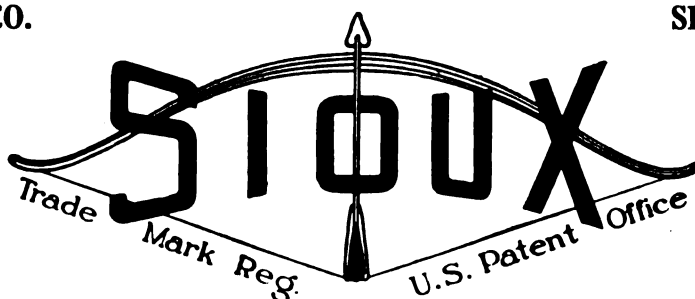
Two Clamp Devices hold valve stem in perfect alignment. The adjustment lever holds cutter firmly and steadily against valve face.

SIOUX SERVICE keeps cutters sharp for you at no cost except carrying charges both ways. When cutter is dull send it to us and we will re-sharpen it and return it the same day it is received. Be sure you get Sioux Tools if you want this free service.

Sold by All Live Jobbers

ALBERTSON & CO.

SIOUX CITY, IOWA



American Garage & Auto Dealer

*A Business Paper Exclusively for the "Small-Town
Automotive Trade*

Vol. XIII. No. 4.

CHICAGO

APRIL, 1922

"Fact Service" Does \$80,000 Business

Michigan Dealer Started Business a Few Years Ago in Corner of Oil and Gasolene Station—Averages Over \$80,000 Yearly Even in Dull Period—"Fact Service Did It," He Explains, "and Keeping Overhead at Conservative Level"

By Raymond M. Foley

"Fact service" is the terse explanation given by Joseph W. Greenhalgh, automobile tire and accessory dealer of Pontiac, Mich., for the successful prosecution of his business, which he has expanded in a few years from a new enterprise started in the corner of an oil and gasoline station in that city to a point where the business block he has occupied for three years is too small and he has purchased a site for a modern 40-foot building of his own.

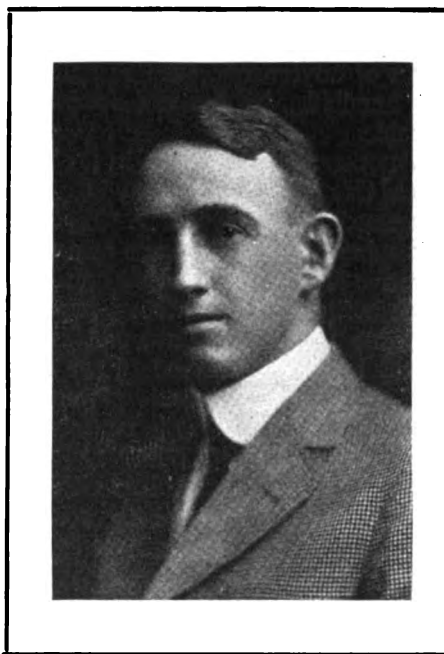
"Fact service" to Greenhalgh and his staff means simply telling the truth about the goods they have for sale, even though it may mean the loss of a sale.

It is not at all unusual for customers of the Northern Automobile Supply Co., which is the name of Greenhalgh's company, to remark: "Joe had the thing I wanted, but he wouldn't sell it to me—said I didn't need it, or it wouldn't work on my car."

In such instances "Joe"—as hundreds of motorists know him—lost the sale in question, but he gained a friend for his store and a booster for his business who came back later for the thing he did need; boosted and came back so often, in fact, that "Joe's" average business, even during the depression period has been above \$80,000 a year.

Here is just one instance of the way in which this "fact service" idea works out. A Ford driver entered the store and asked for a set of 31 by 4 tires. Joe talked with him and learned that he was getting ready to turn in his car on a new one.

"I can sell you the size you want," said Greenhalgh, "if you really want them, but I don't think you do. There is more profit for me in the larger size, but you won't get a cent more trade



"Joe" Greenhalgh—The Motorists' Friend.

value for the car, so you'd better take the 30 by 3½."

The customer thanked him and took the smaller size. Greenhalgh lost a few dollars of possible profit on the deal, but he made a steady customer out of a stranger. Later business made up many times over for the sacrifice on the one sale.

Another instance was one which drew the attention of the writer to

Greenhalgh's store. He had occasion to purchase an automobile jack.

"What kind of car do you drive?" was Joe's question.

The writer named a moderately heavy machine.

"I'm sorry I haven't what you want," said Joe. The writer pointed, in some surprise, to a number of jacks on display in a case.

"Yes," said Joe, "but those are only strong enough for light cars. If you buy one it may play out just when you need it. If you are going on a trip in a hurry, take one of these along, and come back tomorrow or the next day. I'll have what you want then."

Just such methods as these have established a personal, friendly contact for Greenhalgh with motorists of the entire city and for miles about in the country. His customers have come to know that he tells them what he believes to be true and that "trade talk" in this store means "fact talk". If anything goes wrong with the goods afterward, they know equally well that they will get a fair hearing of their complaints.

"We started out on that policy shortly after we went into the business," explains Greenhalgh. "At first I believed that cut-rate policies and appeal chiefly on the strength of price was the right plan to follow.

"We did succeed in building up a good business on that basis and we tried to give real values—but, after we had gotten well started, I saw that permanent success must be built on quality of goods, and on a perfect

understanding between buyer and seller. The things left unsaid ruin good business more often than the claims that are made.

"An honest dealer feels he must back up the claims he makes for his goods. If he tells the whole truth about them, then he has nothing to fear. Of course we have complaints; perhaps, in these several years there have been a half a dozen customers who were dissatisfied in spite of all we could do. I wish there weren't any.

"If there is one thing that stands out to me about the way in which this business has grown, it is the fact that customers remember quality and honest dealing long after they forget price. So we have put the emphasis on quality and service and charge a price in keeping with them."

Incidentally "Joe" is an advertiser of unique parts. He launched a campaign for a reputation along that line three years ago, when there appeared in the local daily newspaper a four-column advertisement featuring a picture of "Charlie," one of the employees of his store. The copy ran like this:

"Joe's Gone North for a Week on a Fishing Trip—But I'm Going to Show Him We Can Make Business Hum While He's Away."

Then followed a list of special offerings in accessories and tires with prices attached that really caused motorists to "sit up and take notice". The advertisement gave a strong impression that "Charlie" had actually taken a high hand with his employer's business and cut prices on staple goods just to make a big showing in the absence of Joe.

Tires of various makes, air gages, spark-plugs, patches, lock-tite and other specials were included.

Men who knew of the store and its reputation for handling quality goods and telling the truth about them, went and bought. There was a big rush during the week Joe was away, and when he came back he found his stock sadly depleted—as he had expected it would be when he wrote the advertisement before starting out on the trip.

That advertisement is still mentioned frequently by customers who come into the Northern Auto Supply store, though it was published three years ago. It was one of the big steps forward made by Greenhalgh in his business, and in establishing himself on friendly terms with hundreds of

automobile drivers whom he had never seen. They laughed over it, went out of curiosity to meet "Charlie" and look at the goods, bought, and have been going back to buy again ever since.

The instance is typical of the kind of advertising Greenhalgh has done—

Keep Out of the Narrow Ruts by Daring to Do!

To my mind, so many men get into narrow ruts mainly because they utterly lack courage. They fear to dare. They mistrust themselves. They have no self-reliance. They shrink from incurring the danger of punishment. They are afraid to strike out lest they make misses. They are obstacle-shy. They are content to jog along in an easy, comfortable, leisurely, uneventful way. They refuse to exert themselves to their utmost; they refuse to attempt to make a first-class record and are content with a second-class one. In plain language, they are cowards.—B. C. Forbes.

and he has been a firm believer in the advisability of using printer's ink—especially in newspaper columns. Other forms of advertising, such as dodgers and handbills, he has not found so valuable.

"Another important item in the success of this business, if it may be called a success," says Greenhalgh, "has been in keeping overhead expense at a conservative level. I noticed that an economic writer in a current popular magazine says that the automobile accessory business can stand 10 per cent rent, figuring on the basis of annual turnover. Perhaps that is true, but I have never paid nearly that."

He indicated the store in which his business is now located—a 20-foot front on the main business street of Pontiac, a short distance from the "main center". It gave room for an adequate display of goods in cases, a tire rack, and an office and repair department at the rear, with storage below.

"I took the lease on this just before the armistice," he said, "when fellows were afraid the war was going to last and business was uncertain. I took a chance and things came out as I anticipated. When business boomed and real estate values soared, I had a lease at a rent that has never exceeded 2 per cent of total volume."

In his repair department, devoted to tire work, Greenhalgh is just as in-

sistent on the "fact service" as in the retail business.

"If a tire isn't worth the repair the owner wants, we don't hesitate to tell him so," he said. "I'd rather have him go away peeved and let some other fellow have the few dollars for vulcanizing—and the cussing when the tire lets go again after a few miles of road work. That chap will come back some other day, when he realizes that we had his interest at heart in giving him such advice."

This spring "Joe" will begin the construction of a one-story building of brick on the 40 feet of valuable frontage he has just acquired adjacent to his present location. But, with the same foresight that has helped build up his business to its present point, he is going to put down a foundation capable of carrying three stories.

"I will want to be ready to go on up when business demands it," he explains. It is safe to say that no building erected this year in Pontiac will be watched with more friendly interest by the motorists of the district than "Joe's" new business home.

Automobile Instruction Book Printed in Arabic.

What is said to be the first automobile instruction book to be printed in Arabic has been received by the Willys-Overland Co., at Toledo, from their dealer Mr. Loukaitis at Cairo, Egypt.

The book is illustrated with views of the motor, of the chassis, and charts of the various mechanical operations that go to make up an automobile.

Construction of Automobile Highway Proposed in Mexico.

The El Paso Automobile Club has started a campaign to make possible an automobile highway from Ciudad Juarez, following the route of the Mexico Central railway line, to Mexico City, says Consul Dye, in a report to the automotive division of the Department of Commerce.

El Paso-Ciudad Juarez is the natural gateway from the southwest of the United States into Mexico, but at present there are no good roads from Ciudad Juarez to the interior. The proposed highway would make the best possible route for automobile traffic between the United States and Mexico City, and it is believed that funds for this construction can be secured from the cities on the way and by a grant from the Mexican national government.

"You Tear 'Em Up; We'll Drag 'Em In"

Says Florida Service Company to Motorists and Sure Enough They Do Drag a Lot of Them In—Practically All Wrecks Turned Over to Repair Department—Service Free to Owners of Cars Sold by Own Sales Department

By Ruel McDaniel

There is but one thing worse than being "smashed up" ten miles from town with no spares to come in on, and that is being "smashed" ten miles out with no available means of being towed to a repairshop. A motorist finds himself in that predicament not more than once or twice in a lifetime, perhaps—but when he does, the man who rescues him is a friend indeed, and a friend who will be remembered.

Jack Ryan, manager of the Standard Motor Car Co., Pensacola, Fla., saw this opportunity of making friends for his concern, since there was no equipment in that city for towing in wrecked automobiles or trucks and it has worked.

Such conveniences as this are not at all uncommon in larger cities, but, in a town the size of Pensacola, it has not occurred to the average garageman that such a vehicle is an excellent investment.

You Tear 'em Up—We'll Drag 'em In.

That is the motto conspicuously painted in white on a deep green-colored, cut-down automobile. "Automobile Ambulance" stands out in full view on one side of the machine. On the rear is apparatus for hoisting the disabled automobile, at the end of which is attached a block and tackle. The "ambulance" was constructed at a comparatively small cost, being made from the chassis of an old Packard touring car.

Considerable favorable comment is always heard as the wrecker runs around town. Although it has been in operation but a few weeks, there are very few motorists in Pensacola who do not know

about the "ambulance" and its convenience in time of unexpected need. As an advertisement for the repair department of the company, it is hard to beat.

The primary object in rigging up the wrecker was for the profit to be made in mileage when automobiles and trucks were towed in. This part of the business alone is paying more than 10 per cent on the investment, and the charges for towage are exceedingly reasonable at that. The average price for hauling a broken-down car to town from any reasonable distance is five dollars. This amount varies, of course, according to the distance the haul is made, the condition of the roads, and the condition of the wreck.

Although the haulage is paying good dividends, it is a small item compared to the extra business brought into the repair department with the aid of the wrecker.

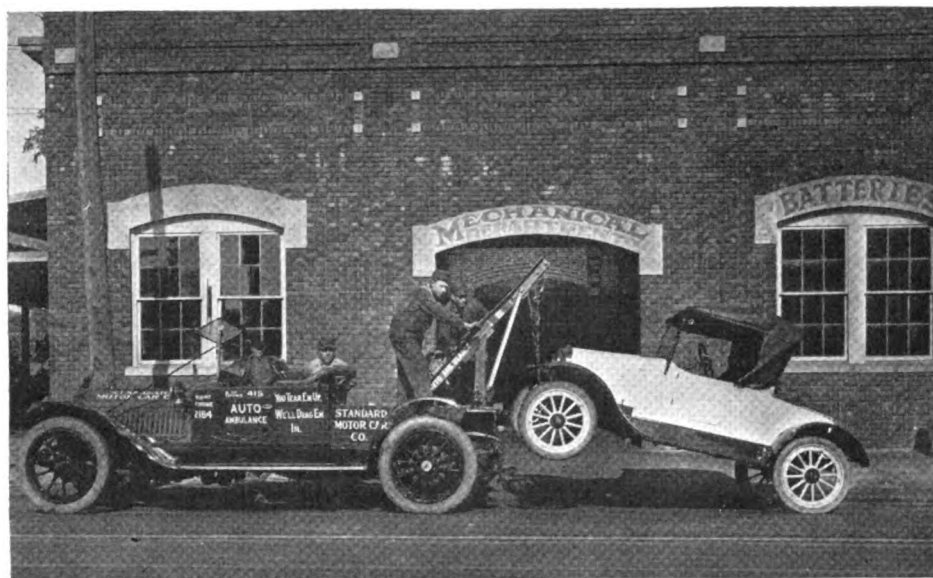
An average of nine out of every ten cars towed to the city are placed in the repair department of the Standard Motor Car Co. for recuperation. Automobiles of all makes, belonging to all

—even in other towns—had not the wrecker gone out and dragged the business in.

The mechanics know their jobs so well that once the car is inside the shop they make the repairs in so excellent a fashion that the owner of the disabled car is a regular customer after the first job. The entire personnel of the company has created a favorable impression on the motorist by rescuing him in time of dire distress, and the mechanical department has turned out work that gives satisfaction. Thus, new customer after new customer is being added to the already long list of satisfied patrons of the repair department.

Still another big boost the "ambulance" is giving the Standard people is the free service rendered to owners of the make of car sold by the sales department of the company. Any time an automobile of the make they sell is reported in distress—regardless of how far from the city it is or the condition of the wreck or roads—the "ambulance" is dispatched to the rescue, post haste.

No charge whatsoever is made for this service. When things like this are done for the owner, he is glad his car is a Nash, and he makes no excuses when he boasts to his friends—some of whom may be in the market for a new car. This gives the sales department a push in the right direction.



Regardless of the Distance or of the Road Conditions, This Unique "Automobile Ambulance" Answers All Calls That Are Made for Assistance.

sorts of people from all over the surrounding country, as well as in that immediate vicinity, are hauled to the shop. Naturally, many of these jobs would have gone to other repairshops

or more, will support a business builder such as the one described here, according to Mr. Ryan. Cars are always breaking down at the

(Concluded on page 16.)

Accounting:

By J. Newton Boddy, C. P. A. (N. A.)

Auditor, Accountant, Systematizer, Specialist in Automobile Accounting

Probably the heaviest loser of all the departments of the average garage is the gasoline department. Many garagemen, learning they could not make it pay, have discontinued the sale of gasoline and carry enough for their own use only. Handled properly and in a good location, gasoline sales can be made to show a profit. The gasoline and oil department is an excellent feeder to the other departments.

To handle gasoline and oils successfully, the tanks and containers must be placed conveniently and in a conspicuous place. High-grade and well-advertised lines only should be carried.

The question of waste in all its forms must be thoroughly considered. Cheap tanks and cheap containers are not always the most economical. All sales must be properly recorded and checked at least daily. Gasolene and oil and grease sales should be separated.

Take the public filling station as a model and use every idea that can be practically adapted to your own garage. Encourage the use of coupon books with your name printed on them. See that all gasoline and oil

[illegible]

Opposite Page of Sales Journal Showing Details of Various Transactions.

used in the shop or in your own cars is properly charged. Make out a sales ticket for every sale. Check your

gasolene sales against your tank inventory once a day.

The average garageman finds his gasoline sales much harder to keep track of than his oil sales, because they are more numerous and also because they are usually more hurried. Many garages have registers on their gasoline tanks. This makes it easy at any time to catch an oversight in not charging or making out a sales slip. It is well, if possible, to have the gasoline gage where it can easily be read by the customer.

Be on hand when your gasolene tank is filled and see that you get full measure. The margin on gasolene is so small that all the profits must be preserved. The average garage owner need not be so particular about his oil sales, as the margin of profit on oil is generous and the shrinkage and evaporation only a fraction of that on gasolene. Oils and greases should be handled in handy packages as well as from the pumps or barrels. If business warrants, it is well to have one man only to take care of the gasoline and oil sales.

Gasolene and oil and grease sales are

[illegible]

One Page of Sales Journal Form Which is Commonly Used by Those Garages Costing Sales Monthly From Inventory.

When the job is completed, the shop

A New Form of Shop Order Which May Be Made Either in Duplicate or Triplicate.

Keep Your Eers Open for Prospecks

Becaws I Kept My Eers Open I Got a Prospeck Today on a Feller That's Going to Buy an Automobile—An Ime Reedin Catalogs, Pete, Soze I Can Kno the Good Points of Our Stock—The More You Reed the More You Kno

By Frank Farrington

Deer Pete:

Do you ever get enny prospects Pete? You kno what I meen, peepel thats going to buy sumthing sumtime. I got a prospeck today on a feller thats going to buy an automobile. It was becaws I kept my eers open. I was in the greeks buying a ice creem sody and I herd the feller that waited on me talking to anuther greek and I coodent tell what they sed from chineez. Gee before Ide hav a langwij that wassent enny more like American that that!

Well I cood tell when they sed Pack-erd and Tin Lizzy and Booick a nd Hudsun and all such names of cars, and that made me keep lissening and bime by one of them sed sumthing in American. He sed: "Well, I got to get sum kind but I dont kno what yet." That was plain enuf wassent it?

So, when I went back, I hunted up the boss and told him Ide found a prospeck and then bime by he went over and bawt him a ice creem sody and got to talking with the feller I told him about and then they both cum back together and the boss giv him a demmunstrashon and got his name down for a tooring car.

Now Ile bet if Persyd bin me he woodent hav enny more notist what those greeks was talking about when they talkt in American than he wood when they talkt greek. I spoze I mite of tride to sell that man a car myself but Ide probably just spilld the beans. So Ime going to lissen wherever I go to see if I can heer about enny more prospecks.

Bob says sum fellers aint enny help a tall about getting bizness like that. He says heel bet Persy never mentions our cars or boosts em or talks about

our garaje when heez outside with other fokes.

I gess thats becaws sum fellers never thinks about the bizness when they aint in it, and they don't think enny too much about it when they are in it at work. If a feller forgets his job just the minnit he puts on his hat and starts for home, I spoze he issent going to boost it very much til he gets

ennybody cums in and buys ennything or dont, if I can get hold of their name and not ask em what aint enny of my bizness, I get that name and their adress and I go and see after theyve gone if the name is on the list and if it aint I tell Sally to put it on. If all of the fellers in our place wood do that it wood make our list bigger all the time, but sum of em woodent bother. Persy woodnt bother to rite down a name if sumbody told him what it was and sed they wanted to be on the list.

A feller whooz looking out for a chance to get sum more names to put on the bosses list can pick em up wherever he goes if he keeps his eers open and uses his brane if heez got enny. I got a brane Ile admit and I aint def and dum too so I get sum names all the wile.

Pete, do you ever reed enny catalogs?

It doessent sound like very exsiting reeding does it? Ile say it dont, but if all you ever reed for is to get exsited then you mite as well reed Smushy Stories or sum other of them magga-zeens that has the jazzy stuf inside and the batheing beech beutys on the outside. But if you just reed that kind of junk how you going to get so you'll kno enny more thats worth while to kno? Aint it so?

Well one of theez agents cum along yesterdy and talkt to the boss about sum kind of a spark-plug that givs you two sparks at once or sumthing. Ive forgot just what it does do and when he was going away he sed to me: "Heers a cupple of catalogs about our line of supplies. When you get time look at one of em and then you'll see what good things theez spark-plugs and other things is."



I Coodent Tell What They Sed from Chineez But I Cood Tell When They Sed Pack-erd and Tin Lizzy and That Made Me Keep Lissening.

back agen and Ile say I dont buleev heez going to boost it very much even then.

Lots of fellers seem to think its the bosses bizness to keep the bizness going soze he can giv them their jobs regguler. And they think their jobs is just to do what work he speshully tells em to do and not to help enny to make the bizness bigger. Well mebbby when the bizness gets smaller and they get fired becaws the boss don't need em enny more, then they mite wake up and see it wood of bin better if they had helpt get sum bizness. Ime that way. I buleev in helping the bizness get bigger. I mite get more pay if it got bigger enuf.

Our garaje has a big list of fokes that has cars and trucks and tracters and it has anuther list of fokes that had awt to hav em. So whenever

So I put one catalog in my pockit and when I was going home in the street car I was reeding it and I red sum last nite too. I aint got to the spark-plugs yet. Thats why I dont kno much about em, but I red about a lot of other things that guy sells and bu-leev me, heez got sum line and when the stuf cums Ile kno what its for and sumthing about it and Ile bet I can sell it as good as Bob or enny of em. Ile bet I can sell it better than the fellers that aint red the catalog and I dont see enny sines of enny of them reeding that other catalog I left where theyd see it.

Bob is going to reed it becaws he sed so. He sed he always got hold of the—what did he call it?—the littera-choor about ennything we stock, and red it soze to kno all the good points they claim about whatever it is. He says "Bill, hows a feller going to be a sailsmun for ennything he dont kno ennything about?" and the anser is that he aint. You tell em he aint, Pete! becaws how can he tell customers what he dont kno?

So Ime kind of nozing around amungst the catalogs I see in the place and Ive found that even things I-thawt I new all about has things about em in the catalogs that I never herd about, so that makes me a better sailsmun all the wile for sumthing. Ime going to be strong for catalogs after this, even if they dont reed qwite so eezy as this dope on the kommick page of the very last evening edishon that you get when you go out to lunch at noon.

You let me know, Pete, how you like reeding catalogs. You kno how to reed dont you? Thats all they is to being able to reed a catalog. The more you reed the more you kno and it all counts for you.

By by yung feller. Rite soon to
Your unkel Bill.

Automobiles Increased More Than 1,000,000 During Past Year.

With returns received from all states, the Bureau of Public Roads, of the United States Department of Agriculture, reports that the motor vehicle registration for the year 1921 totalled 10,448,632. This represents an increase of more than a million over the 1920 figures, or a number equal to the total number at the beginning of 1913.

The greatest increases in registration were in industrial sections, the agricultural sections in general show-

PENLINGS FROM THE PEN OF DIKE.

Howdy! Back again. The "flu" and the rush have kept me away. But now I am back and here to stay.

Swat the fly. One fly killed in April means a million less in June.

It used to be that a merchant only dressed his windows twice a year—once in the Fall and once in the Spring. But that was in the days when a parlor organ was considered a musical instrument.

Did you ever notice a crowd standing looking in a vacant show window? But you do notice a crowd before a neat, clean show window.

The old saying is that "April showers bring May flowers." I say April advertising brings May business.

Lots of talk about the soldiers' bonus—I am for it. Mr. Dealer! Why not offer a salesman's bonus for May and watch business come your way?

Spring is here. Everybody needs a Spring tonic. Business needs a tonic also. Here's a prescription: Advertise daily, smile and work, and business will pick up.

Dandelions are now in bloom,
Frogs begin to holler.
Now's the time to advertise,
Put your shoulder in the collar.

Now is the time to paint up and clean up. There's a slogan saying, "Save the surface and you save all." I say paint the garage and get more trade.

There was a time when merchants turned off their window lights at supper time—but that was in the days when "Ten Nights in a Bar Room" was considered the most popular melodrama.

The success of the department stores lies in the fact that they know how to display their merchandise.

Every store used to have a hitch rack out in front—but that was in the days when girls wore their arctic overshoes buckled up.

ing a smaller amount of increase. No state reported a registration of less than the 1920 figures.

TOURIST SEASON NEAR; ARE YOU READY?

(Concluded from page 14.)
is stretched bearing these words in white letters:

Don't let sand and rain destroy your tire. Buy a cover, get one now. They're cheap.

It is safe to say that the greater majority of those who stop at this garage for information, buy gas, oil, a map, a tire cover, or have repairwork of some kind done.

Thus these several window attractions do their part toward "bringing in the coin."

To further advertise storage space during the season this man had a motion picture film made, in which he showed a string of cars passing into one entrance and one passing out on the other side.

In taking the photographs he used the cars which were in the garage at the time, having each car pass around

several times. It so happened that an Armour Packing Co. car with a sign on each side was in the lot.

People watching the picture naturally gained the impression that this garage was doing "some" business.

But when the Armour car had gone out and come in again a number of times the usual whispered question heard was: "How many Armour cars do you suppose they have in this town anyway?"

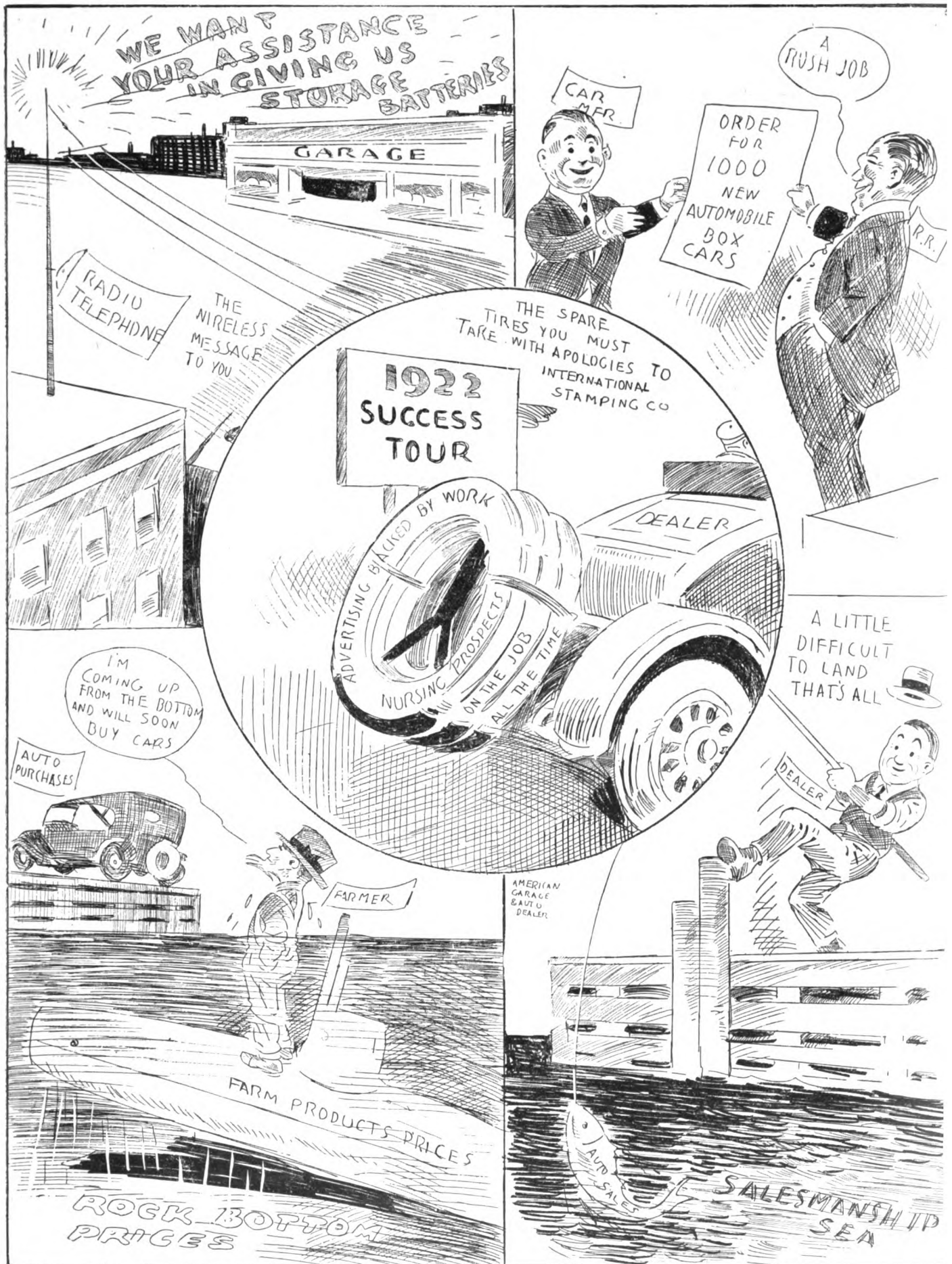
Of course the effect was amusing, but it served the purpose of drawing attention to this particular garage.

"YOU TEAR 'EM UP; WE'LL DRAG 'EM IN."

(Concluded from page 11.)

times least expected and least prepared for. Business is waiting there for the enterprising garageman who goes out and brings it in.

Not only does an arrangement of this sort bring business quickly, but it paves the way for bigger things during the years to come because of the good-will that will naturally be created by rescuing motorists at the time they most need repairmen.



Current Comments and Observations

By The Editor

Automotive Industry Going Strong.

With spring well under way, the automobile industry is going strong. The production of cars is now said to be at the highest market for the past year and a half.

While factories are rushing production of cars, dealers are disposing of more than their quotas and some are frank to admit that sales are exceeding their highest estimates.

Business in accessories is likewise increasing and the entire automotive industry is being looked to as one of the leaders in the movement toward better times.

Again and again it has been stated that the American people have money and that when they felt that prices had become stabilized, they would come back into the market. That prediction seems to have been well founded, for from all sides come reports of increased sales or prospective activity in buying.

The farmers are feeling better and are slowly but surely coming back into the class of potential buyers of things automotive. The better feeling of the farmer is reflected back into the towns and cities located in the great agricultural sections of the country—and they are again purchasing cars, new accessories, and having the old car overhauled and placed in condition to take that month's trip this summer.

Education and Success.

Recently statistics have been published indicating that college graduates making up only 1 per cent of our population, comprise more than 50 per cent of those who achieve leadership in the various walks of life.

The statistics show that this 1 per cent of college men has furnished 55 per cent of our presidents, 54 per cent of our vice-presidents, 36 per cent of

the members of congress, 47 per cent of the speakers of the house, 62 per cent of the secretaries of state, 50 per cent of the secretaries of the treasury,

BRAINS AND SUCCESS.

All cannot expect to attain the great success of men whose names become greater as the years go by, of course, but each of us can expect to add much to our progress if we but try a little harder each day to do, better than the other fellow, those things we are capable of.

In that way we will be contributing something to our national prosperity which must redound to the benefit of everybody. Things do not "just happen." It takes men, material, and, above all, brains and determination to do big things that mean something.—Thomas E. Wilson, president Wilson & Co.

67 per cent of the attorney generals and 69 per cent of the justices of the supreme court.

It will be noted that in this list, the legal profession apparently predominates—and the business man is absent, although it is true that some of our presidents, vice-presidents, speakers of the house and members of congress have come from the ranks of the business men.

We rather doubt if the measure of success be applied to business men that the college educated man would make such a big showing, for the average successful business man is ordinarily a graduate of the "University of Hard Knocks."

However, to succeed in anything, one must be educated, no matter which method is followed—the college or the experience. Both in the end cost a great deal, the latter probably being the more expensive and harder course to follow.

If as a result of taking either of these courses a person learns to really think and reason, after acquiring a

knowledge of certain fundamental principles, success is quite certain to follow.

Hence, the more knowledge about our business we acquire with the full development of our abilities to properly apply the knowledge, the greater success we will attain.

Education gives knowledge—but success depends upon developing the ability to properly apply knowledge. That's what counts.

Signs of the Times.

Despite the coal strike and other strikes, the stock market, which is considered a barometer of future business conditions, continues to advance. There has been an accumulation of incidents, each small in itself, but which together impress the collective opinion of the country as it is expressed in Wall street.

Since last summer each month has witnessed a larger production of pig iron; larger quantities of cotton and wool have gone into consumption. The volume of residential building has almost trebled in the last year. Industrial disputes are shifting from wages to production. Employment is increasing; the railways are ordering equipment and preparing to spend large sums to handle increasing traffic.

These are all favorable signs and they more than counterbalance the unfavorable comparisons which may be brought up.

Employers are beginning to feel the stimulus of profits due to manufacturing under lower prices of materials and labor. The worker is beginning to see that an increase of profits to himself would easily result from an increase of production.

And all of these indications point to better general business for the entire country as the days pass.

Do You "Ask 'Em to Buy?"

The Man in Our Story Didn't Until One of His Customers Showed Him His Oversight—Now He Is Selling the Goods and Finds that Business Is No Longer "Rotten"—Suggestions on What to Sell and How—The Sales Bonus

By J. N. Bagley

It was a gloomy day and a cold, raw northeast wind was blowing as Bill Bassett and I left Soda Springs on our way to the county seat. Now and then large drops of rain were dashed against the windshield. Five miles out of Soda Springs the wind lulled a trifle and the rain began falling and continued until we reached the county seat, some 15 miles from where we started in the early morning.

The trip had been anything but pleasant, as we had slid into a couple of telephone poles and nearly ruined our radiator by trying to move a farmer's hog fence. We finally got in onto the paving and, outside of the damaged radiator and one smashed headlight, were feeling no worse for our trip. Had we had chains with us there would have been very little trouble as the roads were only—as we term them—"greasy."

We drove up in front of a small garage that had a steep, planked approach. The door was open and I tried to pilot my car into the place. Just when the front wheels got well in, the rear ones began spinning on the planks, and I stopped rather than grind the tread from my tires.

Some of the mechanics, and I guess the boss of the place, came out, and together they pushed the car up into the garage.

I stopped "Liz" and we climbed out, stretched our limbs, and shook the mud from our clothing. The mechanics made a few remarks to each other about the car, the roads, and the weather, etc., and hibernated again.

One fellow, who seemed to be owner, janitor and everything, stood there by the side of the car for a few moments, then drew from his pocket an old cob pipe that was made in the spring after the bumper crop in Missouri in '82 and proceeded to fill it and light it.

He flipped the match out of his finger and turned around to find that it had lighted in a pile of waste and set it on fire. He operated on it with his brogans until it was out, and then I asked him if he would sell us a quart of good oil. He said he would sell us a quart of oil, but he didn't know just how good it was for he had forgotten its name.

I put the oil in the car and backed out and, when we drove around the corner, he stood in the door relighting his cob pipe, it having "died on him" while he was getting the oil.

I needed a headlight and radiator repairs and I also needed chains. Maybe he

could have made the repairs and sold me the chains—this I'll never know, for I didn't ask him.

We stopped at eight different garages before we reached our destination and not once did anyone ask us to buy a pair of chains or offer to fix our radiator or broken lamp.

The last man we called upon was sitting on a greasy old chair, smoking another specimen of that same bumper crop in Missouri. He was about half asleep, so I yelled at the top of my voice to get out of the way for I was coming in and I had no brakes. He moved and I drove in and bought another quart of oil.

"How's business?" I asked.

"Rotten," he replied, as he knocked the ashes from his pipe.

"Sell many accessories?" I inquired.

"Accessories, the devil. I've had that showcase full for over a year and never did sell any." As he finished speaking, he turned and pointed to a showcase that was covered with dust, oil measures and newspapers. "I can hardly pay my rent and make a living for my invalid mother," he remarked, as he picked up the water can to fill my radiator.

Every try "Ask-Em-To-Buy?" I inquired. He looked startled for a moment and wanted to know what I meant by that?

"Well, for example, you see I have no chains and the roads are muddy. Why don't you sell me a pair of chains? My lamp is broken. Why don't you ask to fix

it for me? My radiator leaks. Didn't you notice it?"

"Yes, I noticed that," he replied, "but I thought if you wanted anything, you'd ask for it."

In the conversation, he mentioned the fact that he had a sister living in Soda Springs, and that he was going to take his mother up there the following Sunday.

I told him to call on Tim Donohoo and see how he ran his place and get some pointers. That night I got Tim on the telephone and told him to give this chap two years of salesmanship in three hours when he came up—and he did. Since then, no man can get into his place and get out without being asked to buy—he is selling the goods, and business is no longer "rotton."

Business, like life, is what you make it.

What Shall I Sell?

The question of what to sell comes next and it may be answered in many ways, as far as items are concerned, but sell the staple items that are manufactured by responsible concerns and advertised in the leading trade publications. Right now, let me emphasize the fact that two or three good trade journals should be taken regularly in order to keep posted on good selling items—items that are standard.

Do not buy in large quantities for an extra discount, as it only ties up working capital and endangers credit. Buy in small quantities, buy often and pay for each bill.

(Concluded on page 24.)



Ideal Small Garage Recently Opened at Pittsburg, Cal.—Two Entrances and Two Fuel Pumps—It's Known as the "Los Medanos" Garage.

Operation of the Electrical Units

This is the First of a Series of Articles Which Will Discuss the Principles of Construction and Operation of the Various Units of Automotive Electric Systems—Types of Magneto Magnets—Ohm's Law and Table of Wire Gage Sizes

By J. R. Bayston, M. S. A. E.,
Automotive Director, Coyne Trade & Engineering Schools

This is the first of a series of articles dealing with the principle of operation and the construction of the various units in the automotive electrical systems.

It must be remembered that magnetism and electricity are very closely connected—in fact, when one is present, the other can be produced if the necessary instrument is at hand. We are, no doubt, familiar with the action of a simple horseshoe magnet, which has a peculiar property of picking up small pieces of iron or steel. This type of magnet is a permanent magnet, and is used in most all magnetos to produce the magnetic field. Fig. 1-A is a horseshoe magnet, showing the magnetic lines of force, which always travel from the north pole to the south pole.

When two magnets are placed with the two north poles and the two south poles together, as shown in Fig. 1-B, they will repel each other, i. e., they will have a tendency to separate. When they are placed with a north and south pole together, as shown in Fig. 1-C, they will attract each other. An ideal form of keeper is shown in Fig. 2. This is made out of an old silent chain, after first putting it through an annealing process. This softens the metal so that it will not retain magnetism after coming into contact with the steel magnet.

The main advantage of this keeper is that it can be left on the magnet until it is in place on the magneto. To remove, the ends are pulled outward. Do not pull the chain up, as this will greatly weaken the strength of the magnet.

Magneto magnets, if not mistreated, will hold their charge for years. When they are carelessly removed from the magneto, a

great deal of their charge will be lost. Extensive tests show that about 30 per cent of the magnetic strength will be lost if the magnets are removed from the magneto charger to the magneto without the use of a keeper. The keeper must, therefore, be

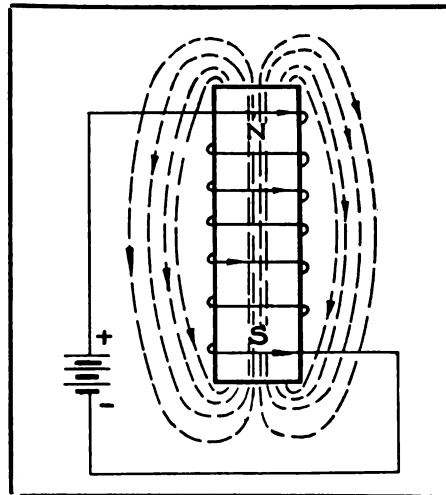


Fig. 3.—Lines of Force in Electromagnet.

placed on the magnet before it is removed from the charger. The function of the keeper is to complete the magnetic field by forming a metal path across the poles.

When magnets are placed on a magneto, the north poles of all the magnets *must* be on the same side of the magneto armature in order to cause a magnetic field to pass through the armature.

An electromagnet consists of a core of iron or soft steel, around which is wrapped several turns of insulated wire, as shown in Fig. 3. When an electric current, taken

either from a generator or a battery, flows through this coil of insulated wire, the core is magnetized and the magnetic lines of force will flow from the north pole through the air to the south pole. These lines of force always flow in a direction that bears a certain relation to the direction of the current flow and to the direction in which the coil is

wound. When the current ceases to flow, the coil immediately loses its magnetism.

The right-hand rule is generally used to determine the polarity of the core. Fig. 4 illustrates this rule, showing that, when the fingers of the right hand are wrapped around the core in the direction of the current flow, the thumb will point to the north pole of the magnet or the direction of travel of magnetic lines of force. If the current was sent in at the bottom of the coil instead of the top, the polarity of the coil would be reversed or, if the coil was wound in the opposite direction, its polarity would also be reversed.

This principle is made use of in every automotive electrical system, as it operates the battery-generator cut-out, sometimes called the automatic or the reverse current cut-out. The function of this instrument is to prevent the battery from discharging into the generator and to connect the generator to the battery when the voltage of the generator is sufficient to charge it.

There are two kinds of electricity—static and voltaic. Static electricity is present in the air at all times, but it is more pronounced in the summertime, especially during a thunder storm. We have all noticed the sparks that appear when a cat's back is stroked. These sparks are static electricity and have a very high voltage, but little or no amperage. As this voltage is so high, static electricity will instantly discharge itself to a body of lower voltage.

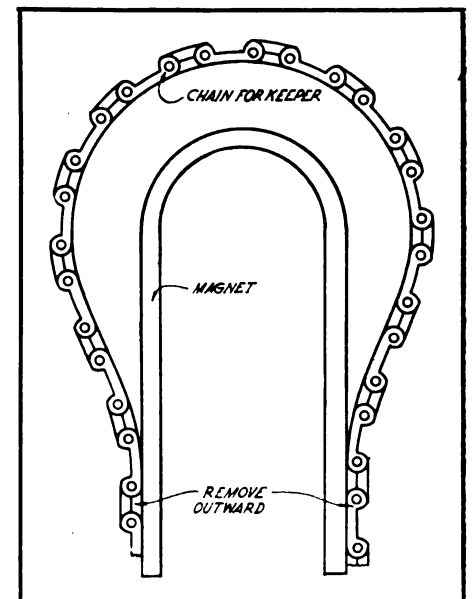


Fig. 2.—Ideal Keeper Available in Most Any Repair Shop.

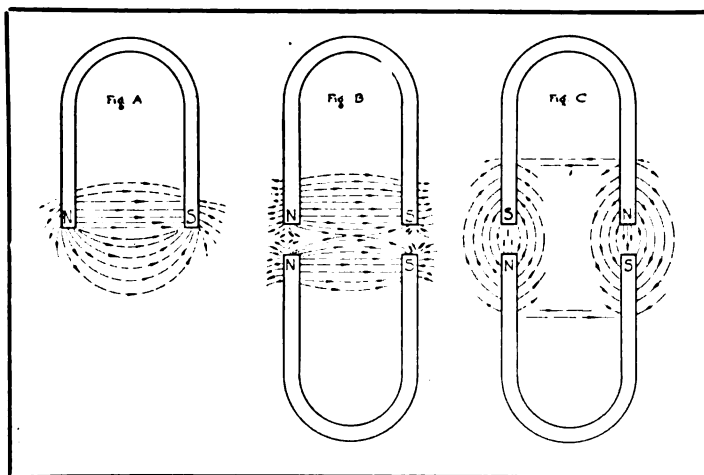


Fig. 1.—A—Magnetic Lines of Force Travel From North to South Pole.
B & C—Like Poles Repel, Unlike Poles Attract Each Other.

Voltaic electricity has very low voltage and high amperage comparatively. It is, therefore, used exclusively in automotive electrical systems, although some authorities classify the "high tension" current go-

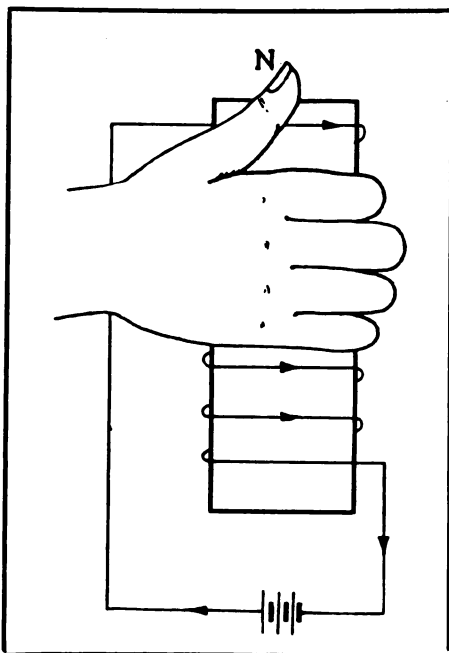


Fig. 4.—Finding Polarity of Electromagnet.

ing to the spark-plugs as static electricity, as the voltage is between 12,000 and 18,000, the amperage never exceeding one-hundredth part of an ampere.

There are three terms used in talking about voltaic electricity that must be understood in order to obtain a clear idea of the operation of the various electrical devices. These are the *volt*, the *ampere* and the *ohm*.

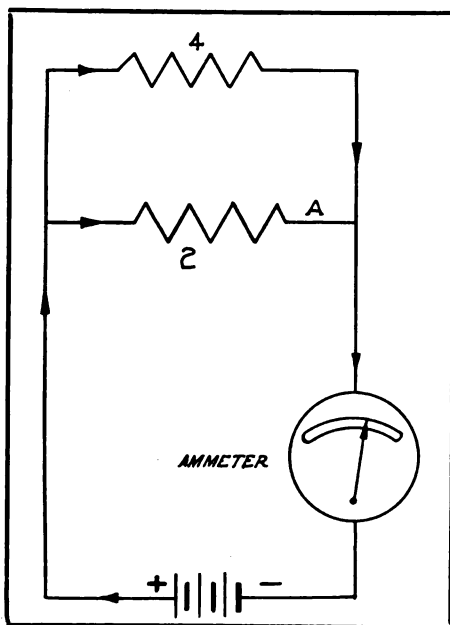


Fig. 6.—Resistance Units in Parallel.

In order to clearly understand these terms, we will compare them to the water system of a small town.

If a water tank is placed 100 feet above the surface of the ground and a faucet

is connected to a pipe leading to this tank, water will flow from the faucet when the valve is opened. The water is measured in gallons and the pressure forcing the water out of the faucet is measured in pounds per square inch. The amount of current flowing through an electrical circuit is measured by a unit called the *ampere*, and is compared to the amount of water flowing from the faucet. The pressure that is forcing the ampere through the circuit is a *volt*, and it is compared to the pressure forcing the water through the faucet.

When the height of the tank is increased to 200 feet, the pressure that forces the water out of the tank will be double, and twice as much water will flow from the faucet. If the size of the opening is now decreased to one-half the original cross-sectional area, the flow of water will be proportionately decreased. In other words, the same amount of water that was flowing when the tank was 100 feet in the air is now flowing from the hydrant.

This same rule applies to the electrical system. If we increase the voltage, greater amperage will flow through a wire of a given size. If the size of the wire is decreased, less amperes will flow. This is due to the fact that, when we decrease the size of the wire, we increase the resistance offered to the flow of the ampere.

The resistance of an electric circuit is measured by the *ohm*. The number of ohms of a circuit increases as the length of the wire increases, and decreases as the size of the wire increases.

In order that we may find the number of amperes in a circuit, or the amount of pressure forcing these amperes through the circuit, we must know the value of an ampere.

One ampere is the amount of current that will flow through a resistance of one ohm with a pressure of one volt behind it.

One volt is the pressure required to force one ampere through a resistance of one ohm.

One ohm is the resistance offered to the flow of one ampere with a pressure of one volt behind it.

If we have the values of two of these qualities, the other one can easily be found by substituting the known values in the following formulas:

Keeping the foregoing facts in mind, if a resistance of one ohm is connected between the terminals of a battery or a generator having a voltage of six, a current of six amperes will flow. If this resistance is increased to three ohms, then the current flow will be cut to one-half and only two amperes will be flowing. In other words, the voltage divided by the resistance or ohms indicates the number of amperes that will flow through the circuit. This rule is known as Ohm's law. It can be used to find the amount of the amperes, the volts or the ohms. Transposing this rule to

find the other qualities, we have these:

- Amperes = volts \div ohms.....(1)
Volts = amperes \times ohms.....(2)
Ohms = volts \div amperes.....(3)

An easy way to remember this rule is to draw a triangle, as shown in Fig. 5. *V* is above the line, while *A* and *O* are below the line. Referring to the triangle, $V = AO$ or *A* times *O*. $O = V/A$ or $V \div A$ and $A = V/O$ or $V \div O$.

The formula when used commercially is generally as follows:

$$I = E/R$$

When *I* = Induced current or amperes *A*

E = Electromotive force or voltage *V*

R = Resistance or ohms *O*

Example: A certain starter draws 300 amperes from a 6-volt battery when cranking a stiff engine. What is the total resistance of the starter?

Solution: As the resistance of ohms is to be found, we will use formula (3). It will then be: Ohms = $6 \div 300$ or 1/50th of an ohm.

Example: A certain headlight bulb draws two amperes from a 6-volt battery. If two of these bulbs were connected in such a manner that the current must flow through both of them—that is, connected in series—before returning to the battery, how many amperes would flow?

Solution: As we have doubled the re-

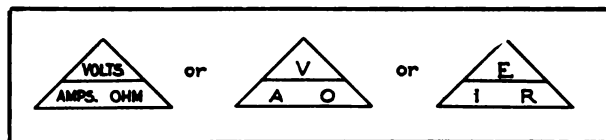


Fig. 5.—Easy Way to Remember Ohm's Law.

sistance that is placed in the battery circuit, the ampere flow will be divided by two and would, therefore, be one ampere.

Here is another method which can also be used to solve this problem: To find the ohms' resistance of one lamp, formula (3) can be used—Ohms = $6 \div 2$, or 3 ohms. Adding the resistance of the two lamps together gives the total resistance of six ohms. Using formula (1) to find the ampere flow gives $6 \div 6$, or 1 ampere.

Referring to Fig. 6, how many amperes will flow through the ammeter if two resistance units are connected in parallel, one having a resistance of four ohms and the other a resistance of two ohms?

First, we will eliminate the 4-ohm resistance unit for the present and find the number of amperes that will flow through two ohms with a pressure of six volts. Using formula (1), we have $6 \div 2 = 3$ amperes, or the current flow at the point *A*, Fig. 6. The 2-ohm resistance is now eliminated and we find, by the use of the same formula, that $1\frac{1}{2}$ amperes will flow through the 4-ohm resistance with a pressure of six volts. Therefore, the total current flowing through the ammeter will be 3 amperes + $1\frac{1}{2}$ amperes, or $4\frac{1}{2}$ amperes.

(Concluded on page 44.)

Construction of Pneumatic Tires

Important That Tire Man Thoroughly Understands Tire Construction and Nomenclature—Tires May Be Either Machine or Hand Made—How the Tire Is Cured—Tables of Sizes and Oversizes and Plies Found in Various Types

By H. J. White and Lowell R. Butcher

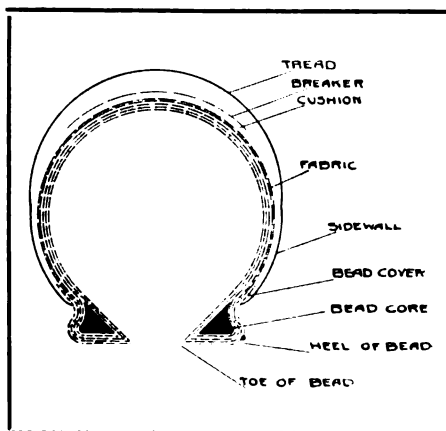
In repairing pneumatic tires the tire man is forced to remove certain parts and it is important that he thoroughly understand the construction and nomenclature of tires. The illustration shows a cross-section of a pneumatic tire and the names of the parts as given will be used frequently in this and in subsequent articles.

Upon the base or carcass of a tire depends its real strength. The carcass is made up of from four to eight plies of closely-woven cotton fabric or cotton cord fabric. These layers or plies are impregnated with rubber to give the casing tensile strength and wearing qualities. The number of plies of the carcass varies with the size of tire, more plies being added as the size increases.

Aside from tires having a carcass of fabric or cord fabric, we find another type of tire in which the carcass is made of heavy cable cords. From two to four layers or plies of cords are used in a tire of this type, the cables running diagonally across the tire.

The bead is that portion of the tire which comes into contact with the rim, holding the tire in place and giving it shape. There are three different kinds of beads—the regular clincher; the quick detachable or Q. D., clincher, and the straight side.

The bead of the regular clincher is made of soft rubber, allowing it to be stretched slightly for placing over an endless rim. The quick detachable clincher bead resembles that of the regular clincher in shape, but has its core made of hard rubber or wire cable. This type is used on a rim that is split or has one flange removable.



Cross-Section of Pneumatic Tire and Part Names.

The straight side bead, as the name implies, is straight and fits the rim without clinchers. The bead core in this case is non-stretchable, being made of hard rubber and reinforced with small wires or cables. When this type bead is used on a tire it is necessary to have a split rim or a rim with a removable flange.

That portion of the bead which is next to the tube is usually called the toe of the bead and the part that fits into or against the rim of the wheel is called the heel of the bead.

The bead is protected by a strip of medium-weight fabric that extends from a short distance above the bead channel to the toe of the bead and, in some cases, continues around the toe of the bead and ends on the inside of the casing. This bead cover, or chafing strip, protects the bead

from rim wear and strengthens the casing at this point. On the smaller sizes of tires only one ply of fabric is used, while two are generally used in the larger tires. This will be a very important fact for the repairman to remember when removing the bead cover for a repair.

The sides of a tire are covered with a tough, highly-compounded rubber which serves to protect the carcass from friction, weather and road wear. This rubber covering extends from the channel of the bead to the tread line and is usually spoken of as the side wall. The thickness of the side wall of the tire depends upon the practice which each particular manufacturer has adopted.

The part of the tire that comes into direct contact with the road surface is called the tread of the tire. The tread of a tire extends from the 45-degree angle of the tire to a like point on the opposite side. Tread gums are highly compounded in such a way as to make the best wear-resisting rubber.

Treads may be roughly divided into three classes—according to the form of the portion that comes into contact with the road. These are the plain or smooth, the non-skid and the ribbed. The non-skid types may be further divided into the vacuum type and the raised tread type.

The tread of a tire has little strength, as far as resisting the air pressure is concerned, but gives the wearing qualities to the casing and protects the carcass.

Under the tread of a tire is found a strip of loosely-woven fabric. This breaker strip is impregnated with rubber and, as



Quick Detachable Clincher—Fabric Cord.



Regular Clincher—Fabric.



Straight Side Tire—Fabric Cord.

the name implies, it serves to ward off the shocks from stones or sharp projections of the road which might injure the carcass if left unprotected. It also acts as a binder for the tire, giving body to it by stiffening the cushion and tread.

The cushion is placed between the breaker and the carcass. In some casings a thin layer of the cushion may also be found between the breaker and the tread. Cushion gums are of low compound and specific gravity.

Tread rubber, being of a highly-compounded nature, absorbs moisture, but the low specific gravity of the cushion makes it practically waterproof, thus protecting the carcass of the tire. The great adhesiveness of cushion gum makes it an excellent uniting factor between the carcass and the breaker.

Pneumatic tires may be divided into two classes, according to the type of rim they fit and according to the construction of the carcass. According to carcass, we may divide tires into fabric tires, fabric cord tires and cable cord tires. The cable cord carcass is not used in many of the smaller sizes of tires and the repairman's work will concern itself mostly with fabric and fabric cord types.

The division of tires according to the rim upon which they are used affects only the bead construction—that is, the carcass may be the same whether the bead is made to fit a regular clincher, a straight side, or a quick-detachable clincher rim.

In connection with the quick-detachable type of tire, it might be well to say that it is almost obsolete. Few, if any, car manufacturers are using it as standard equipment at the present time. The straight side tire is in almost universal use, and is always found on vehicles that use the larger sizes of tires. Most tire men claim that a better mileage is obtained from the straight side type because of the greater pressure in contact with the rim.

Rubber and cotton constitute the greater part of the modern pneumatic tire. The cotton is used to make the carcass and the fabric parts of the tire, and is favored because it may be produced quite cheaply and yet has the qualities of strength and heat resistance. Considerable heat is generated in the body of a tire and any material used for the carcass must be able to resist this.

The cotton used in the tire is graded according to the place where it is grown or originally came from. Long Sea Island, Egyptian and domestic cotton are the three grades usually used in tire manufacture. Long Sea Island cotton originally came from the Bahama Islands, but the seed has been imported and planted on the low islands along the coast of the southern states. This cotton is excellent for tires, as the staples average $1\frac{1}{4}$ inches long and have a high tensile strength.

Egyptian cotton is produced along the Nile in Egypt and, to some extent, in the

Southern states. It is a good quality of cotton but contains a quantity of short fibre and is not quite so uniform as the Long Sea Island.

Domestic cotton is of shorter fiber and does not have as high a tensile strength as the other two grades. As the name implies, it is produced in the southern part of the United States.

Compounded rubber is used to form the cushion, tread and side walls of the tire. Many compounds are used with the rubber, no two manufacturers compounding alike. These compounds may retard the cure, hasten it, toughen the gums, add color to the tread and affect the gums in various ways according to the compounds used. Sulphur, however, is used in every case, as rubber will not cure or vulcanize without its use.

Tires may be made either by machine or by hand, according to the practice of the manufacturer. The fabric or fabric cord is prepared for use in tire building by frictioning and coating. Fabrics are frictioned or impregnated with rubber by using the calender. The fabric is run between hot rollers that force the gum into the fabric. The center roller of the calender, which is coated with rubber, runs faster than the outside rolls and rubs or frictions the rubber into the fabric. The fabric cord is coated in a similar manner except that the rolls are cooled and run at the same rate of speed.

After frictioning and coating, the materials are cut to proper lengths and widths before they are delivered to the builder. Tires are built on cores that give the desired shape and size to the inside of the

tire. Before using, these cores are brushed with core paint and placed on the spindle of the building stand. The fabric is applied to the core and stretched down over the bead.

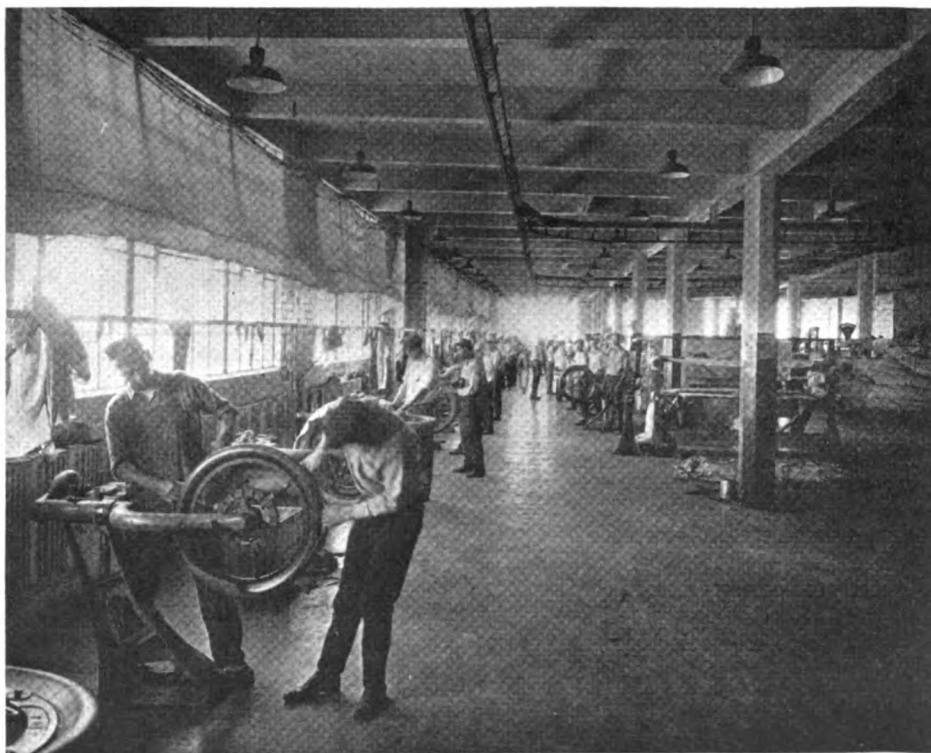
When tires are built by hand, one ply is added at a time and the splices or laps of the fabric placed opposite. In machine building, the fabric is rolled on the core from rolls, two and sometimes three plies being added at a time.

The bead may be applied after two plies have been placed on the core and the remaining ply or plies built over the toe of the bead, or it may be fastened on after all the carcass is in place. After the carcass has been built and the bead placed, all surplus fabric extending over the toe of the bead is trimmed off and the bead cover applied.

From this point on the manufacture varies, depending upon the method of curing. The two methods used are the full-molded and wrapped-tread. If the wrapped-tread method is followed, gum strips are placed over the line of the chafing strip and the side wall applied a short distance above the channel of the bead. The tire is now jacketed or wrapped and semi-cured before applying the breaker and tread for the final cure.

A large percentage of the smaller sizes of tires is built by the full-molded or single-cure method. The tire is built as in the wrapped-tread method, but the breaker and tread is applied and the tire cured at one operation.

Cord fabric tires are made by using methods similar to those followed in building fabric tires, but are usually hand-built.



An Interesting Shop Interior Showing Process of Building Tires by Hand.

The ending of the plies is usually different from the arrangement in fabric tires, but manufacturers' methods differ greatly and it is impossible to give a description of an arrangement that would be general.

Cable cord tires are built by using two, three and four plies, special machines for their manufacture being used in most cases. In two-ply cable tires, the cables are made by twisting cotton thread into cables of the proper size and adding the frictioned material or rubber at the same time.

A layer of cushion stock is placed on the core and the cables applied by the steel fingers of a machine that carries the cables diagonally back and forth across the core until a complete layer is in place. Another layer of cushion stock is added and the operation repeated, the second layer of cables being placed diagonally opposite the first. The bead is now added in the form of a split-bead core, and the remainder of the tire is built as in fabric or fabric cord tires.

In three and four-ply cable cord tires, the cables are smaller and are impregnated before rolling on a drum that has a spiral slot for cutting the cylinder of cables into a sheet of cables. In four-ply cables, two of these sheets are stitched together and applied at the same time. Bead cores are placed and two more plies added, followed by the bead cover, breaker strip and tread.

Three-ply cable cords are made in practically the same way, except that the inside ply runs around the tire and the other two are placed diagonally to the core and opposite to each other.

As stated before, tires may be cured by either the full-molded or the wrapped-tread method. In the full-molded method, the casing is placed in a steel mandrel that completely encloses the tire. These mandrels mold the tread shape and are split for removing the tire. The cure is accomplished by placing the mandrels in a steam kettle and curing for a length of time suited to the compounds used and the size of the tire. The cure will vary from one to two hours, at steam pressures that vary from 40 to 60 pounds.

If the wrapped-tread method is followed, the mold is made of side flanges that come up to the side wall of the tire. Tire and mandrel are wrapped and the steam kettle used to complete the cure. Either method of cure will produce good tires, if materials and workmanship are of the proper quality.

After tires are cured, they are trimmed, inspected, tested and marked. All defective casings are plainly marked as such and sold as seconds.

Tire sizes have been standardized until only a few of the numerous sizes of a few years ago are now used as standard equipment. This simplifies the equipment needed in the tire repairshop as tire lasts are needed for only a few sizes of tires. The table shown is of the sizes of tires in general use.

Most manufacturers make these sizes of tires and their oversizes. Oversize tires are used where the load is greater than was originally intended. To fully understand the regular and oversize of a pneumatic tire, the two measurements given when designating a tire must be clearly understood. In a 32 by 3½-inch tire, the 32-inch dimension is the diameter of the tire meas-

| Regular, in Inches. | Oversize, in Inches. |
|------------------------|-------------------------|
| 30 by 3 | 31 by 3½ |
| 30 by 3½ | 31 by 4 |
| 32 by 3½ | 33 by 4 |
| 32 by 4 | 33 by 4½ |
| 34 by 4 | 35 by 4½ |
| 32 by 4½ | 33 by 5 |
| 34 by 4½ | 35 by 5 |
| 36 by 4½ | 37 by 5 |
| 34 by 5 | 36 by 6 |
| 36 by 5 | 37 by 5½ |
| 36 by 6 | 38 by 7 |
| 38 by 7 | 40 by 8 |
| 40 by 8 | 42 by 9 |

Common Tire Sizes and Oversizes.

ured from a point on the outside of the tread to a similar point on the opposite side of the tire. The 3½-inch dimension is the height of the cross-section measured from the toe of the bead to the top of the tread.

If the height of the two cross-sections, or 7 inches, be taken from 32 inches, we will have 25 inches or the diameter of a rim using a 32-inch by 3½-inch tire. To find the oversize of a tire, ½ inch is added to each cross-section or one inch to the diameter of the tire. Thus the oversize for a 32-inch by 3½-inch tire would be a 33-inch by 4-inch size. The use of an over-

| Size, Inches | Kind. | Fabric. | Fabric Cord. Me- dium. | Heavy. |
|--|------------|---------|------------------------------|--------|
| 3 | Regular | 3-4 | .. | .. |
| 3½ | Regular | 3-4 | 5-6 | .. |
| 4 | Regular | 5-6 | 6 | 4 |
| 4½ | Regular | 6 | 7 | 5 |
| 5 | Regular | 6-7 | 7-8 | 6 |
| 5½ | Regular | 7 | 8 | 6 |
| 6 | Bus | ... | 10 | 6 |
| 7 | Heavy duty | ... | 10 | 8 |
| 8 | Heavy duty | ... | 12 | 10 |
| 9 | Heavy duty | ... | 14 | .. |
| Cable Cord—From 2 to 4-ply, all sizes. | | | | |

Fabric, Fabric Cord and Cable Cord Plies.

size does not change the size of the rim but will add more air space for the overload. In some of the larger sizes of tires, a double oversize is used but the rim size is the same as for the regular size.

DO YOU "ASK 'EM TO BUY?" (Concluded from page 19.)

taking the cash discount, for the cash discount on small orders will more than amount to the discount on the large buy that cannot be taken care of.

Do not give your valuable time to "yap" peddlers who never come but once. Stick by the regular salesmen that call upon

you. They will treat you fair and square, for their bread and butter depends upon whether or not they retain you as a regular customer.

When they come in, find out from them the methods used by other dealers to move goods and when a method appeals to you put it into use.

Get people into your store. This is the first thing to do before the goods can be offered for sale. Keep something unusual happening around your place so people will talk about you and becoming curious, will come to see.

Cash In on Manufacturer's Advertising.

Cash in on the manufacturer's advertising. When a spark-plug manufacturer runs a double-page, two-color spread in a trade journal or national publication, clip it out and put it in your window along with a nice display of the goods so that people will know you handle an advertised line. Most folks like to try advertised goods. Ask the manufacturer for window signs, wall cards, etc.—he will be glad to furnish them—and where the manufacturer furnishes these with his goods or packages for displaying his line, get them and use them, for these items are "silent salesmen" and work for you while you are employed elsewhere.

The Meanest Man I Ever Knew.

When I was a "knight of the grip," I called upon a prospective customer who had written the house saying he wanted to buy certain articles which he had in stock. I called upon him when he was busy in the backyard and, after I had waited for some 30 or 40 minutes, he came in and I explained my mission.

"Yes, I want some of your goods," he said.

"I'll see you in a few minutes." I waited for over an hour and found he had cranked his old "bus" and driven out to the country to be gone until 3 o'clock.

The salesmen of responsible houses are the dealers' best friends, if the dealers only knew it. Instead of treating them like convicts from "Sing Sing," or some other foreign seaport, the men upon whom they call should give them the "glad hand."

Don't advertise automobile accessories—advertise automobile equipment. Get folks into your place—and then "Ask-Em-To-Buy." The car owner who drives into the garage with a spare tire and no tire cover, needs someone to ask him to buy.

You, as owner and proprietor, can always be on hand. Therefore, wouldn't it be a good plan to offer a bonus on sales, in the way of commissions, to every man in your employ, thereby doubling or even tripling the sales of equipment?

Many shops have increased their sales 200 per cent by offering an inducement to each man employed, thereby making every man employed a salesman. Business is not "rotten" and never will be if every dealer will "Ask-Em-to-Buy."

How to Repair the Leaky Containers

Leaks in Metal Containers May Be Repaired Either by Soldering or by Riveting—Cleanliness Is of the Greatest Importance in All Soldering Operations—Solder Preparations and Methods Described and Illustrated

By Gustav H. Radebaugh

Leaks in all metal containers may be patched by soldering or by riveting. Soldering is a process of uniting the surfaces or edges of the same or different metals by partial fusion. Soldering may be divided into two classes—hard and soft. Soft soldering is the class used for all general mend-

open air and dropping into it zinc taken from a discarded dry cell battery.

Fig. 3 shows how the zinc is cut into small pieces. Add these pieces slowly at first, as the acid will boil up. When this boiling action subsides, add more pieces until no more bubbles rise from the zinc.

muriate of zinc in most of the repairshops, as it is very inexpensive and so convenient to apply to a job.

A flux composed of hydrochloric acid, zinc and water—forming a basic zinc chloride—will lose some of its strength if the solution has any opportunity to evaporate.



Fig. 1. Scrape or File Space About Leak.

ing. This solder consists chiefly of lead and tin and fuses at a very low temperature.

Cleanliness is of prime importance in all soldering operations. The space around the leak may be cleaned by scraping, filing, or with sandpaper or emery cloth, as shown in Fig. 1.

A patch about one inch wide and $1\frac{1}{4}$ inches long is cut from a piece of tin, as shown in Fig. 2. It is best to use tin that is not rusted. If a rusty patch is all that can be secured, it should be cleaned with sandpaper or emery cloth.

Soldering fluids are generally known as fluxes. For soft soldering the most common fluxes used are rosin, sal ammoniac, muriate of zinc and the several kinds of commercial fluxes. A good grade of muriate of zinc can be made by placing some hydrochloric acid in a quart glass jar in the



Fig. 2. Cut Patch from Piece of Tin.

This is now ready to be poured into a bottle. For ordinary use this is usually diluted with an equal amount of water.

Soldering salts form a very convenient and inexpensive flux. In Fig. 4 the operator is shown pouring a portion of the salts into a glass jar so that water may be added. It is always best to have the jar that is to be used for this type of soldering flux fitted with a tight cover, as in Fig. 5. This keeps out dirt and prevents evaporation.

Commercial fluxes have found a useful place on the work bench of the average mechanic. They are formulated to give to the workman a flux that is easily applied, definite in its action on different metals to be soldered, causes solder to flow more evenly, and is an effective agency to aid quick partial fusion when soldering. With these superior qualities, commercial fluxes have taken the place of the soldering fluid

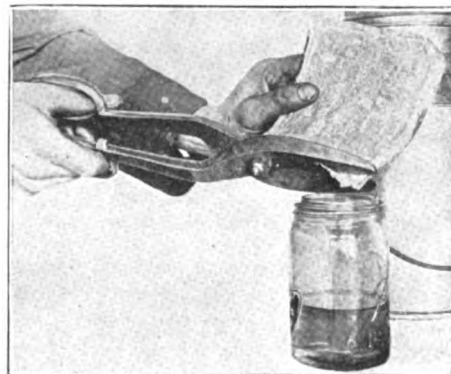


Fig. 3. Zinc is Cut into Small Pieces.

This would allow the evaporation of the water which is necessary to form the basic chloride. It can be restored, however, by the addition of a little acid with a quantity of water. Tin can be used in place of zinc if necessary.

The soldering iron is made from copper and it is always best to have a heavy iron for general patching work. The size of an iron is determined by its weight, which is specified as so much per pair. Soldering irons should be heated, as shown in Fig. 6, to a black or dull red heat in a forge fire or with a gasoline blowtorch which is similar to that shown in use in several of the illustrations.

If the iron is heated to a high temperature, it is necessary to re-tin the iron every time this occurs. Do not leave the iron in the fire between operations. In bringing the iron from the fire to the job after



Fig. 4. Pour Portion of Salts Into Jar.

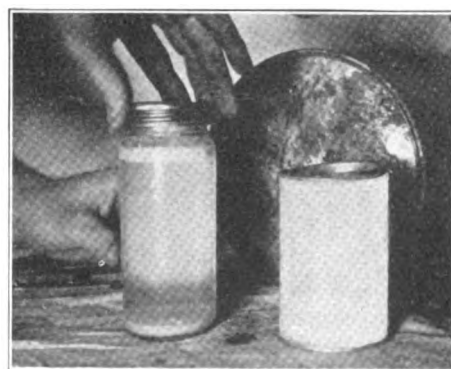


Fig. 5. Jar Fitted with Tight Cover.



Fig. 6. Heating Soldering Irons.

it has been tinned, it is always good practice to dip its point in the flux or soldering fluid. This cleans the point. It can also be rubbed on the sal ammoniac and the same results obtained.

The soldering iron is prepared for soldering by cleaning the end while still hot by either filing, rubbing on a stone or on a piece of sal ammoniac as in Fig. 7. After the iron is clean, it is tinned as shown in this illustration, the iron being covered by



Fig. 7. Clean Soldering Iron End While Hot.

permitting the hot iron to melt down some of the solder on the sal ammoniac. This causes the solder to fuse on the iron.

Another very simple scheme is to take a can lid with a depression in it, in which a small piece of solder and some commercial soldering flux is placed. In using this commercial flux, it is never good practice to dip the hot iron in the bulk of the flux as it has a tendency to separate the materials in the flux. When the iron is clean and still hot, rub the end of it in the fluid and solder. This will tin the iron.

When it is necessary to heat the iron in a forge fire or gas stove, a good shop kink to prevent destruction of the tinned surface of the iron is to heat the iron inside of a short piece of gas pipe. This prevents rapid oxidizing of the tinned surface of the soldering copper.

The space around the hole or the crack on the job must be tinned. This is done by first covering the surface with the soldering fluid or with the soldering paste.

Such soldering supplies can be purchased from any hardware or supply store. To cause the solder to flow easily, a little powdered rosin may be sprinkled on the space

to be tinned. This is not necessary, however, if the commercial soldering flux is used. The job is now ready to receive the solder.

With the heated soldering iron, shown in Fig. 8, float a little solder over the surface around the hole or crack. While the work is still hot enough to melt the solder when placing a patch, the excess of solder should be wiped off with a dry rag. This



Fig. 8. Float Solder Around Hole or Crack.

is not necessary when soldering up a crack.

The patch is tinned in the same manner as the surface around the hole and is located over the hole while the hot soldering iron is applied. When the solder starts to flow, the iron is removed. Sometimes a patch may require a little extra solder around the edges in order to make a good tight job.

Men are always developing new and easier ways of doing work. To simplify the many soldering jobs demanded of the average repairshop, a solder that is cored, is being used by a great many mechanics, the cored center of the solder being filled with a soldering flux. This solder is especially adaptable to radiator patching, electrical repair soldering, etc.

As a reference to Fig. 9 shows, this solder is in wire form—a decidedly advantageous feature, as it is not as easily wasted as when in a large stick. Soldering is always done easier when it is possible for the operator to do the job without too much lost time, as the cooling off of the iron delays the melting of the solder and makes the job more difficult.

With this type of combination solder and

flux, both hands of the operator are free to quickly complete the job as shown in Fig. 10. Obviously the operator does not delay the job by stopping to apply the flux during the soldering operation.

Another very successful method that has been used for mending leaks in containers that have copper and galvanized iron bottoms is by soldering in a copper rivet and

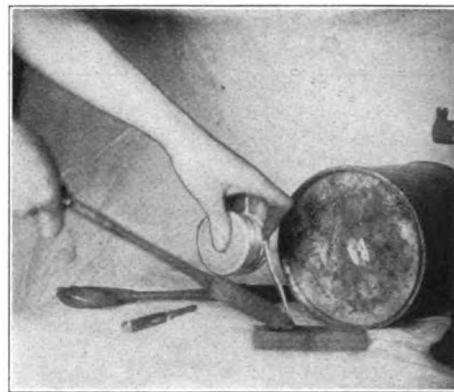


Fig. 9. Solder in Wire Form.

burr. As shown in Fig. 11, the hole is enlarged to receive the copper rivet by using the tang of a file. In this operation the space around the hole is cleaned to prepare the surface for tinning.

However, some very good repairs are made without soldering over the rivet after it is driven down into place. If the rivet is not to be soldered, it will not be necessary to clean a surface for tinning. It is important, though, that all the rust is removed, as a clean surface gives the rivet a firmer fit on the material.

The rivet used for this type of repair-work is also used in harness repairing. Some of the rivets of this design are made from soft iron and copper-plated. These are not as successful as the old-fashioned copper rivet and burr. The rivet should be cut to the proper length—that is, having about twice its thickness protruding from the hole. It is then placed into the hole and the burr put in place, as shown in Fig. 12.

In this operation a steel bar is obtained that has enough weight to back up the blows of the hammer on a rivet. In copper riveting very light blows are delivered

(Concluded on page 28.)

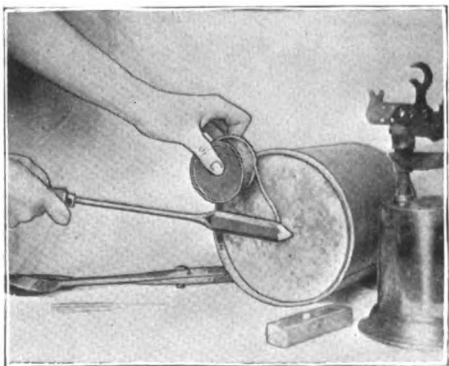


Fig. 10. Both Hands Free to Complete Job.



Fig. 11. Hole Enlarged for Copper Rivet.



Fig. 12. Burr Is Put Into Place.

Welding, Cutting and Brazing Practice

One of Principal Parts of Welding Shop Equipment Is the Preheating System—Three General Classifications of Fuel to Be Used Which Vary According to Local Conditions—Preheating Devices Which You Can Make

By David Baxter

In the preceding chapter we purposely omitted any discussion of one of the principal appliances for a completely-equipped welding shop—especially insofar as it is connected with garage repairwork.

This was on account of it being a somewhat complex subject, rather than not properly a part of welding-shop equipment, for it should come under that heading. In fact, every repair welding shop must have some sort of system or device for heating certain classes of work before applying the welding flame, as well as for annealing or heating the job again after it has been welded. Therefore, the subject of this chapter might very well be that of welding-shop equipment, the same as the last chapter. However, it is of great importance and deserves to have at least one chapter devoted to it alone.

The devices employed for heating welding jobs before applying the weld have been aptly termed "preheaters." But, as stated above, they are also used to heat the job again before the final cooling, for which they are called reheaters.

In installing a preheater, or a preheating system, the first consideration is, no doubt, that of the fuel to be used. This depends greatly upon the location of the welding shop and local conditions. What is available for one shop is out of the question for another from the standpoint of practicality.

There are three general systems employed with several variations to each class. In other words, we could say that there are three general classifications of fuel used in preheating, each of which is varied somewhat according to local conditions. In some cases all three kinds are combined and one shop may employ all three kinds of fuel. The individual welder must learn by experience what is most available for his shop.

No doubt the ideal fuel is artificial or natural gas. It is under almost absolute control at all times and may be adjusted to a steady, even temperature, or any graduation, accurately enough for the average shop. It is easily confined or localized, or it is readily arranged to envelop very large jobs with intense heat.

There is no muss to clean up afterwards and no troublesome arrangements to make before starting the preheater. When shut off, it starts cooling immediately and, therefore, does not heat up the room unnecessarily. These things, and more, make the gas system of preheating desirable even at an additional cost above the price of other systems.

Probably the next best preheater is an oil burner, although some prefer the crude charcoal burner. Both have an advantage over fuel gas, as they are strictly portable and may be taken to any job outside the shop when necessary. It should be noted here that the welder who is situated where he can use gas may have an oil burner for outside work. He should also have a supply of charcoal for emergency, if for nothing else.

Reverting to the oil-burning preheaters, it may be said that there are several styles

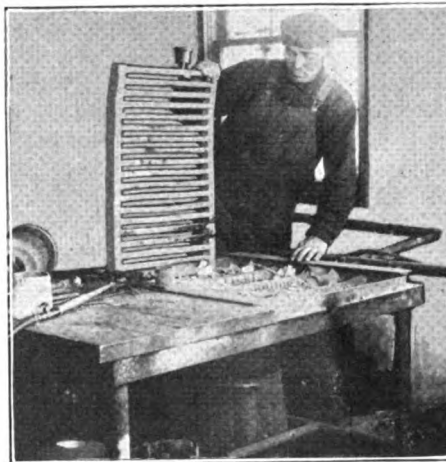


Fig. 1. Combination Welding Table With Natural Gas Preheater at One End.

on the market, the most of which follow practically the same principle. Usually a heavy steel tank is furnished, to which two sections of hose connect two generator burners.

The style for small repairshops requires that the tank be pumped full of air by hand. This air pressure forces the oil out through the hose to the generator or burner, where it is atomized and burns with a blue-white flame. So long as the tank is supplied with oil and air, it will burn with an intensely hot flame.

Like natural gas flames, the heat of the oil burner has quite a range of temperature and is accurately controlled within certain limits. One generator burner may be used to heat the whole of a small job, or a small area of a large job. Then two or more burners can be arranged to heat the whole of a large job. The job may be in the welding shop, out on the road, or in another town. The oil-burning preheater is just as portable as the welding plant.

Third on the list of preheating fuels is charcoal. If properly handled, it gives very

good satisfaction. The heat is recommended for steadiness and can be made quite intense. Any failure can undoubtedly be traced to incorrect management of the fire.

First, there should be a heavy bed of coals before the job is placed over the fire. Then the job should not be buried directly in the coals, but arranged so the heat will arise on all sides. The fire should have a directly upward draught. If more charcoal is needed, it should be fed in a little at a time before the first embers die, making it ignite readily. Another requirement is to confine the heat so that it will not dissipate at the sides of the job.

A handy device is to have the job on one grating and the coals on another below it. This permits the fire to be tended without disturbing the job, and at the same time, prevents the job from being overheated in some of its delicate parts. A fire-brick furnace is handy for this, since it can be constructed to conform to the shape and size of the job. The same equipment can be used on all manner of shapes and sizes of castings or other automotive parts.

The fire-bricks are laid loosely without mortar. The gratings are placed between rows of the brick and an asbestos or sheet iron cover is placed over the top. Some of the bricks are removable, to enable the operator to tend the fire. Crevices are left in the lower row of bricks to provide draught. The whole thing is easily built up or torn down. The worst trouble is to clean up the muss.

Another form of preheating is by a wood and coke or coal fire, which is, after all, but a variation of the charcoal system. It has, however, the disadvantage of noxious fumes. Due to this and to the fact that such a fire is difficult to keep continuous, it is probably better to employ a forge or at least a power blower. If a forge is inconvenient, the welder can construct an apparatus similar to it, such as is shown in one of the illustrations.

When forced draught is used, however, the welder must be very careful lest he burn the metallic life out of the job, to avoid which, he should be careful to keep the job from direct contact with the fire. A grating similar to the one recommended for use with straight charcoal is advisable. This will be sure to hold the job up out of the fire so that the heat can envelop the whole of it evenly.

Other variations of the preheater ideas are to combine two or more agencies—say charcoal and coke, or oil burner flames

above and a charcoal fire below. A plain wood fire, alone or with charcoal on top of it, may be used.

The chief essential in any or all of the preheating methods is to be able to arrive at a certain condition of heat. This is difficult to describe, due to the wide varia-

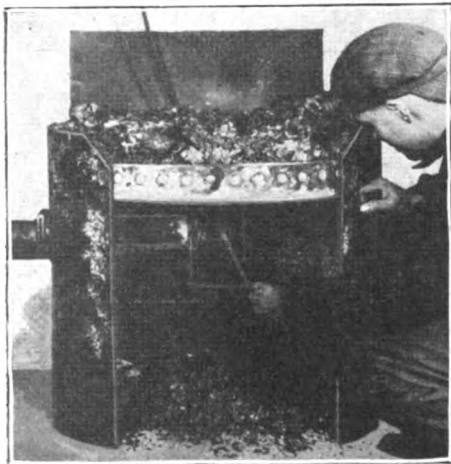


Fig. 2. Home-made Preheater Patterned After Forge.

tion in the element of human judgment, coupled with the nature of the job and the metal of which it is composed.

Some metals require and stand more heat than others without danger to the metallic values. For instance, an aluminum casting cannot be heated so much as cast iron or steel because its low melting point will cause it to crumble or collapse when it reaches a very hot stage. Cast iron is injured by the very bright red stage of heat—more so if long continued. So it is pretty much an open question as to what stage of heat should be maintained throughout the welding process.

Disregarding the difference due to the kind of job, some expert torch operators prefer to heat the job until the red is visible in daylight. Others heat it just below this, or to where the glow does not show in the light. Thus some welders preheat certain jobs to one stage of red while others employ what is termed a black heat. The beginner should heat the job to a medium red stage. Then he is fairly certain to have the metal expanded sufficiently.

Preheating is employed mainly for two reasons—to facilitate the welding and to regulate or control expansion and contraction. In the first instance, it is readily seen that a heated casting will melt easier and quicker and, therefore, requires less time and welding gases. When the metal has been preheated, it has already gone a long way toward melting and welding.

The red-hot casting, especially if it is heavy, requires less welding gas because it does not tend to draw so much heat away from the weld by conduction—and it takes less welding gas to complete the weld because the heated metal melts faster.

In the abstract, some jobs must be preheated to prevent the reactions of heat in expansion and contraction. Perhaps one ex-

ample will suffice: The weld metal when molten is fully expanded and, if the job is not preheated, the adjoining metal and the rest of the casting are not expanded. Naturally, then, as the weld cools and contracts or shrinks, it tends to pull upon the surrounding metal. If this metal cannot be drawn inward, then the shrinking weld will pull away from it in the shape of a crack, or the weld may crack within itself.

The welder must learn to judge whether or not the weld can move the adjoining casting in and out, in order to be able to tell whether or not to preheat a job on account of expansion and contraction. In a correctly preheated job, the casting is expanded when the expanded filler metal is added and can, therefore, shrink or contract in unison when both cool. Literally, the shrinkage of the contracting casting follows the shrinkage of the weld inward.

Of course, the heat of the weld passes to an area of the metal surrounding the melted section to aid in equalizing the strain, but this is insufficient on many automobile jobs. The duration of the welding does not permit enough heat to be conducted to other parts of the casting to expand it sufficiently to take care of the contraction. The usual run of automobile work must be preheated more or less.

These are the elementary reasons for heating previous to welding. There are many other complications which we will endeavor to understand further on. Suffice it to say here that the garage welding shop must have some form of preheating system in addition to the other essential equipment.

Fig. 1 shows a simple but effective way to construct a preheater where natural gas is available. This is in the form of a combination table and has a battery of gas burners at one end. These burners are home-made and are connected to a manifold



Fig. 3. One Type of Oil Burner Convenient for Preheating.

leading to the gas supply pipe. Each burner has an individual valve. All or one may be used. One end of the burner pipe is closed and slots are sawed down each side. An air-mixing device is situated at the valve end of each burner. A cast-iron grat-

ing is provided, to be placed over the battery of burners.

A home-made device for preheating small jobs is shown in Fig. 2. With this apparatus, charcoal, coke or wood may be utilized as fuel. It is constructed of old boiler iron and has a pan and tuyere iron similar

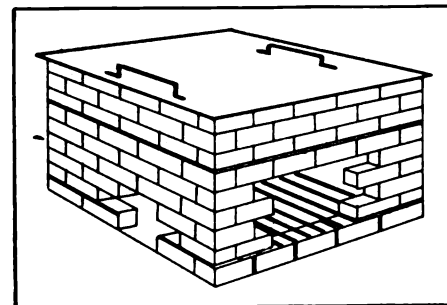


Fig. 4. Fire-Brick Preheating Oven.

to an ordinary blacksmith forge. A motor-driven blower is attached to the tuyere. The blower is regulated by a damper, by which the desired amount of air is controlled.

The worst trouble with this kind of furnace is that it is liable to get too hot and melt part of the job if it is not watched. However, the welder can preheat many different kinds of jobs, and use the apparatus for an ordinary forge if necessary.

Fig. 3 shows a type of oil-burning preheater that is handy in any shop, whether gas is available or not. The generators and burners are connected to hose of sufficient length to enable the welder to preheat almost any size job. With this style burner, the heat can be localized or confined to any particular spot or area of the job, or it can be arranged so the heat will entirely envelop the job. The air tank is pumped by hand and has a gage to indicate the pressure.

An idea of arranging a fire-brick oven for preheating castings in shops where neither of the other systems of heating are at hand, is given in Fig. 4. The job is surrounded by a wall of fire-brick covered with a sheet of heavy tin or asbestos paper to confine and equalize the heat. A charcoal, wood or coke fire may be employed. This furnace may also be used in connection with air-pressure oil burners.

With one or all of these preheating devices, the automobile welder is well-equipped to handle any kind of car work and many other outside jobs as well.

HOW TO REPAIR THE LEAKY CONTAINERS.

(Concluded from page 26.)

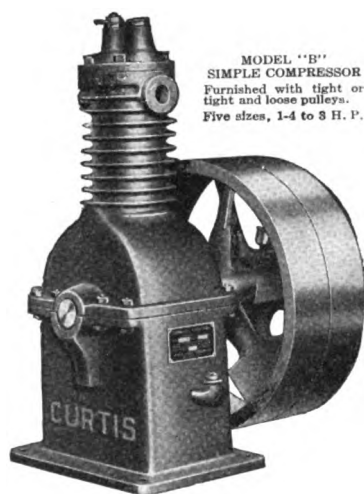
with the hammer. Use the ball peen hammer for riveting copper, as it has a tendency to spread the material and not bend it over. See that the burr is forced tightly against the material. Rivet around the edge of the burr with the cross peen hammer. This insures a tight fit and will prevent leakage.

The rivet is now soldered in, the operation being performed in the same manner as has been explained.

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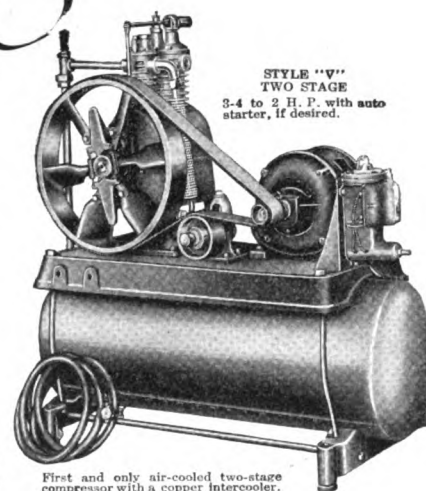
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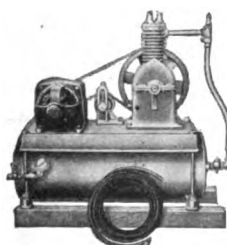
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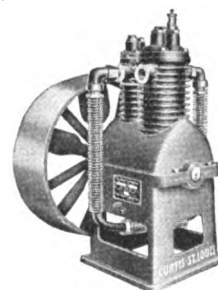
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Why Not Use the Wasted Light?

Effects of Prisms and Curved Surfaces on Direction of Light Rays Passing Through Them—How Headlight Lenses Work—Necessity of Focusing Bulbs as Designer of Lenses Intended—Make Careful Road Tests of Lenses

By Robert Livingstone

Light rays always travel in straight lines unless something—such as a reflector or a prism—is put in their way to change their direction.

We have already seen how a reflector changes the direction of a ray of light by throwing the light off at the same angle that the ray met it, with only a little loss of intensity due to the fact that a reflector absorbs some of the energy of the light and reduces the strength of the rays that are reflected.

This absorption of energy may be compared to what happens to a billiard ball when it is shot against a rubber cushion and bounds off with a little less speed than it had when it struck. In the case of a reflector, as in the case of a billiard cushion, the loss of intensity depends upon the nature of the reflecting surface. For instance, a highly-polished silver surface might have an efficiency of nearly 90 per cent, while a very little dirt or tarnish on it might reduce the efficiency to 50 per cent or less.

On the other hand, polished nickel, while it looks as shiny and bright as silver, will only reflect about 50 per cent of the light under the best conditions. This is mentioned as a warning never to have a reflector plated with nickel—you might just about as well leave it rusty, so far as improving its reflecting ability is concerned. Silver is the only practicable finish for a headlight reflector.

So much for reflectors. Now let us see what happens to the light rays when they pass through transparent substances, such as glass. If the glass is flat on both sides and the sides are parallel, the light goes straight through it so long as it strikes

square against the glass. But, if the light strikes the glass at an angle, the rays are offset slightly, the amount depending upon the kind of glass and its thickness. The illustration shows what is meant.

This is not important in the case of a headlight because the glass front is so thin that the beam of light is spread only a very little more than if there were no glass. There seems to be a mistaken impression that bulging the glass front of a headlight has the effect of spreading the light more than a flat glass, but this idea is entirely wrong.

But if the thickness of the glass is not kept uniform—then something happens to the light—it is bent out of its original straight line of travel.

A prism—in other words, a piece of glass of triangular cross-section—has the property of refracting, or bending light rays that strike it without much more loss of light than would be caused by the light passing through a perfectly flat piece of glass. Headlight “lenses” as they are commonly called—they are really not lenses at all—are made up of groups of prisms. The proper placing of the prisms, and their angles, determines the shape of the beam of light after it goes through the lens.

Suppose we begin with one single prism and find out what it does. That will make it easier to see what any group of prisms will do. The amount to which the light is bent out of its straight path depends upon two things—the kind of glass that is used and the angle or pitch of the prism. Inasmuch as the glass used in headlight lenses is substantially the same for all makes, we will not consider that as a factor here.

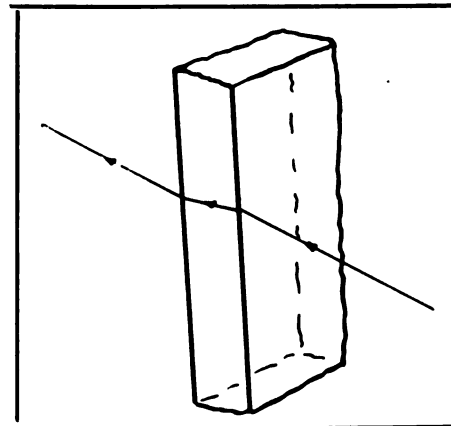


Fig. 1. Light Ray, Passing Through Flat Glass, Is Very Slightly Moved to One Side But Not Bent from Original Direction.

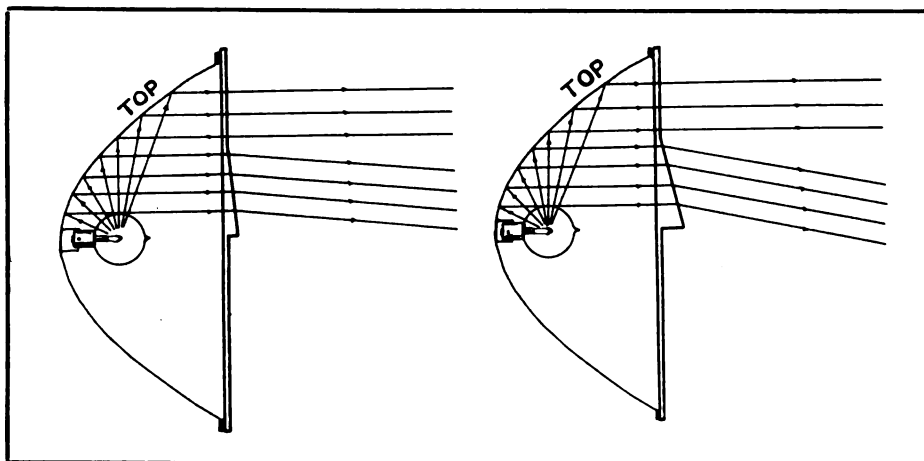
Two of the illustrations show how the degree or angle of the prism changes the amount of bending of the light. The thicker the base of the prism, the more the light will be bent—always around the thick end of the prism. So, if we wanted to bend a ray of light downward, we would use a piece of glass that is thicker at the bottom than at the top.

A beam of light consisting of a large number of rays, such as come from an automobile headlight, can be bent downward either by using one prism that extends the full height of the lamp and making it of the proper angle, or by using a series of narrower prisms of the same angle.

You will remember how we learned in a previous article that the total beam from the headlight is nothing more than a group of reflections or images of the filament. Therefore, it makes no difference whether one large prism is used to bend all of the images or whether smaller prisms are used, each bending its own portion of the beam independently. The number of prisms makes no difference.

Groups of small prisms are generally used for two reasons: First, the designer may want to do something more in the way of giving good light on the road than to simply bend the beam down below the glare limit. Second, small prisms enable the lens to be made much thinner and lighter in weight than would be the case if only one prism—nearly an inch thick at the bottom—were used.

Not only would there be trouble in getting too thick a glass into the headlight, on account of its hitting the reflector or projecting so far in front as to be un-



Figs. 2 and 3. Light Is Always Bent Toward Thick End of Prism. The Thicker the Base of Prism the More the Ray of Light Is Bent.



Sell this Quality Tire at a big profit to yourself

The Lincoln Tire & Rubber Co. is offering a special sales proposition on the Lincoln Tire. It is such an unusual proposition that it will enable even the dealer in small quantities to meet the **keenest** competition and yet sell a "quality" tire at a big profit.

The Lincoln Tire is a **QUALITY** tire. Fabrics are guaranteed for 6,000 miles, and cords for 8,000 miles.

And the Lincoln Tire is a trade builder.

Your territory may be open. Wire or write at once for this exclusive sales proposition.

Lincoln Tire & Rubber Company
714 Prospect Ave. Cleveland, Ohio

sightly, but a slab of glass weighing several pounds, would soon jar the average headlight to pieces.

Although bending the light straight down, sufficiently to bring the highest rays below the level of the top of the headlight, would do away with glare, it would not give a good driving light—especially if the lens is designed to use the bulb set at the focal point of the reflector, thus making the smallest possible beam.

There would be more light on the road it is true, but the light would be in the wrong place on the road—much the same as if the headlight were tilted down. There would be too much light about 100 feet ahead of the car, and not enough in the distance beyond or at the sides of the road. Nothing but the center could be seen except very dimly.

To partly overcome this disadvantage, lenses sometimes have, in addition to the horizontal prisms, curved surfaces on one or both sides of the glass that are calculated to spread the light sidewise into a fan-shape. These curved surfaces run in an up-and-down direction and they act the same as prisms do except that, instead of bending the light uniformly to the right or left, they bend it more at some parts than at others.

This sidewise spreading needs to be done by means of the lens if the lens is designed to use the bulb at the focal point to make the beam very narrow before it strikes the lens. Here again the curve may extend clear across the glass, or there may be several curved sections with the same result.

On the other hand, if the designer of the lens intends that the bulb shall be placed ahead of the focal point or behind it, in order to get the best possible distribution of light, the reflector gives plenty of spread to the light and the lens does not need to be designed to have any spreading effect.

The prisms that bend the rays of light downward will do their bending without increasing the sidewise spread over what is given by the reflector itself.

It may as well be mentioned here that the light that comes direct from the filament without going back to the reflector does not need to be considered, because the amount is so small as compared with the light from the reflector. If a 21-candle-power bulb is used, the light coming forward from the bulb itself will only measure 21 apparent candlepower, while the beam of reflected light may run as high as 50,000 apparent candlepower. It is this powerful reflected beam that needs to be controlled and properly distributed to get rid of the glare and to light the road.

It should be plain from the foregoing that the first step in designing a lens is to decide where to set the bulb in the reflector—whether it shall be at the focal point to give parallel rays, behind the focal point to give spreading rays, or ahead of the focal point to give crossing rays. The amount of reflected light available is the same in any case. It is merely a matter of deciding what portion of the road shall have certain amounts of light and then placing groups and combinations of prisms so as to distribute the light as desired.

Stopping the glare is one thing, lighting the road is another. Some designers have almost entirely ignored everything but stopping the glare. Some have gone to great pains to see that the light that is taken from the "glare area" above the level of the headlights is utilized in places where there was no light before. Others simply bend the light down on top of the same area that would be lighted without any lens at all.

Hoods, visors, sections of colored glass, even coloring of the entire glass, are often seen in lenses which are designed only for stopping glare.

Such makeshifts to overcome inefficiently designed prism arrangements indicate only that light is wasted by being trapped inside of the headlight. They are found only in the lenses that are poorest from the standpoint of lighting the road.

There is a wide opportunity for choice among lenses, and the accessory dealer should make his choice only after careful

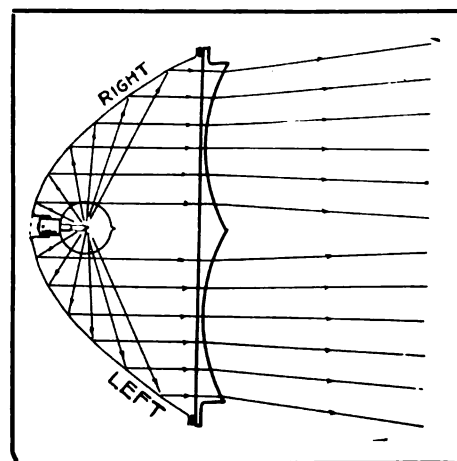


Fig. 6. Surfaces Curved From Side to Side Fan Light Sidewise.

tests on the road. The fact that a lens is not illegal is a mighty poor selling point as compared with ability to give better light than plain glass will give.

Government Printing Office Issues Pamphlet on Cutting Oils.

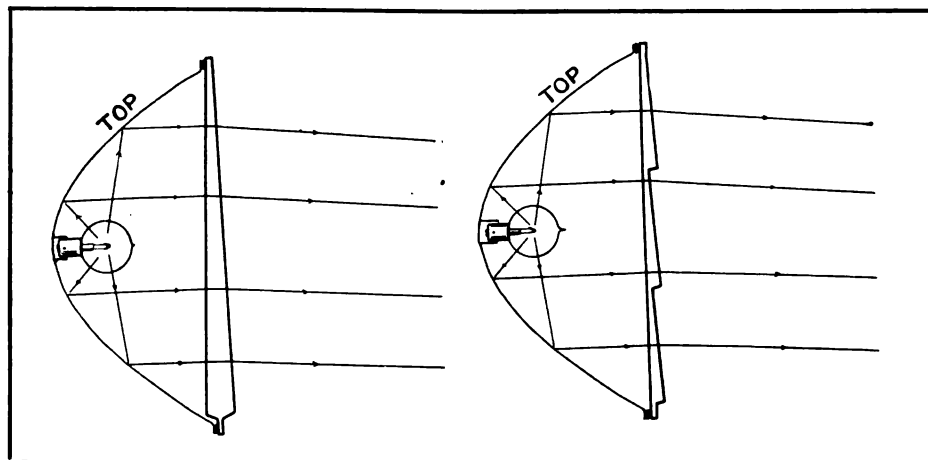
Technologic Paper No. 204 of the United States Bureau of Standards on the subject of cutting oils will soon be available for distribution. It may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents per copy.

The paper is divided into two parts, theory and practice. In the first part, the difficulties attending the proper lubrication of the cutting tool in machine work are described, and the reasons why lard oil is particularly suitable for this work are set forth.

An important function of cutting fluids is to cool the tool and chip, and for this purpose alone water with its high specific heat is well suited but it rusts the machines, and for this reason where water is used such alkaline substances as soda or soap are always added. In conclusion, part 1 suggests methods for the measurement of the adhesion of oils.

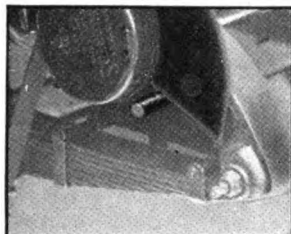
Part 2—practice—considers the correspondence which the bureau conducted with many large machine shops throughout the country as to their experience with cutting fluids. The different kinds of oils which have been used for this purpose are listed, and attention is given to the possibility of using emulsions made up of mineral oil compounded with neutralized sulfonated oil and formed into a permanent emulsion with water.

Mineral oils compounded with alcoholic solutions of soap and a thick soap solution and mineral oil, marketed as a paste, are also described. In choosing any cutting fluid, it is pointed out that the character of the metal to be worked should be considered. Brittle metals, such as cast iron, are easier to lubricate than the so-called "draggy" metals.



Figs. 4 and 5. One Large Prism or Several Small Prisms Bend Light Same Amount Provided Angles of Prisms Are Same.

Lyon Spring Bumpers are quickly and easily attached to any car



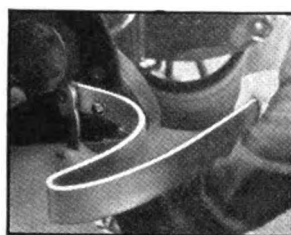
1 Insert Hook Bolt on lower edge of car frame, about one-half inch from Snubber.



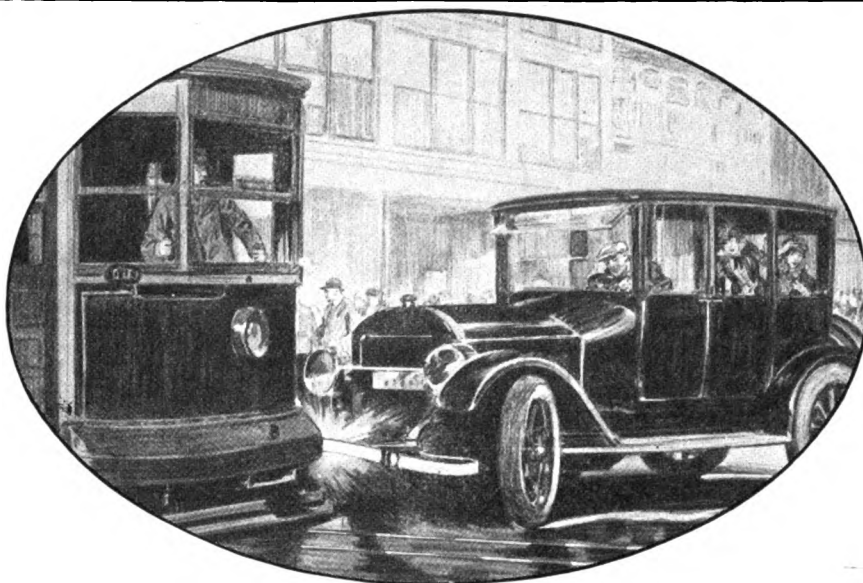
2 Apply Bracket to Hook Bolt.



3 Hold Bracket and Hook Bolt in position while Bumper Leaf is placed on Hook Bolt.



4 Place Lock Washer and Nut on Hook Bolt and tighten.



Not Even Scratched

DANGEROUS street crossing! Brakes on hard! Car skids and bumps trolley! But it's nothing serious. Car is protected by Lyon Bumpers.

It is because of the wonderful protective qualities of Lyon Spring Bumpers that they are so much in demand. For the same reason they have become one of the best paying accessories that car dealers, garages and accessory shops can handle. Turnover is fast—congested traffic and increased possibilities of collisions are making Lyon Spring Bumpers easier to sell all the time.

The powerful spring steel construction plus the Lyon-patented opened "loop-end" design enables Lyon Spring Bumpers to take blow after blow and always spring back into perfect shape. When struck, the "loop-ends" yield to the blow and absorb it completely. The chassis never feels it.

We guarantee the Lyon Spring Bumper to take the full force of any blow at 15 miles an hour without damage to bumper

or car. No other bumper is so resilient—so damage resisting!

Insurance companies make a 12½% reduction on cars protected front and rear with Lyon Spring Bumpers. This is a mighty strong selling argument for you, because the insurance reduction is enough to pay for the bumpers.

The Lyon "New Way" attachment makes it possible to attach the Lyon Spring Bumper in ten minutes, regardless of snubbers or other shock absorbers. No alterations or drilling are necessary—see the illustrations on the left. The "hook-bolt" that is used is a Lyon-patented feature.

These superiorities plus the attractive appearance of Lyon Spring Bumpers enable us to sell more Lyon Spring Bumpers than all the others put together. In fact, a year ago the demand was greater than our production. But now our daily capacity of 5,000 Lyon Spring Bumpers permits us to *guarantee* prompt and dependable deliveries.

Prices range from \$10 to \$23

METAL STAMPING COMPANY, Long Island City, NEW YORK

Car Dealers: Our bumpers are manufactured under basic Lyon patents. More than a million Lyon Bumpers are already in service.

Jobbers: If your stock doesn't include Lyon Bumpers, write to us; our proposition will benefit both of us—it is fair and square.



Lyon Standard Bumper



Lyon Convex Bumper

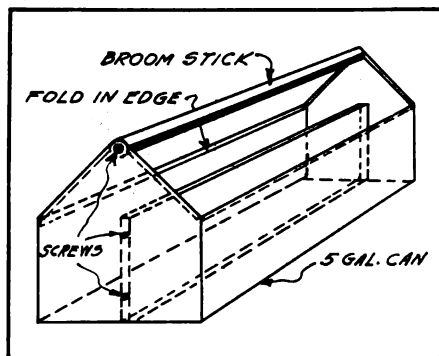
LYON

RESILIENT BUMPERS

Practical Hints for Shop Mechanics

Tool Kit From Old Oil Can.

A tool kit, or bolt-and-screw tray, may be made from an old 5-gallon oil can in a few moments of spare time. One side of the can



Partition Divides Kit Lengthwise.

is removed and the ends shaped as shown in the illustration.

An old broom handle forms the handle and is fastened to each end of the can with a screw. The kit should have a partition that divides it lengthwise. This partition serves to stiffen the can and prevent it from buckling.

Other cross partitions may be put in if desired. It is a good plan to fold in each edge of the can slightly, to prevent cutting the hands when using.—I. R. B., Iowa.

A Useful Garage Brush.

If a piece of angle iron—or a piece of steel bent into that shape—is attached to the ordinary garage brush much time and labor can be saved.

The angle iron, or steel, is used in lieu of a hoe or scraper, to loosen the oily dirt that accumulates on the garage floor. It is affixed to the brush with screws, just above the bristles. To use it, merely turn the brush over.—G. F. S., III.

Gives Full Generator Output.

When driving a car in which the generator output is not sufficient to keep the battery up to the proper reading, I have found it very satisfactory to coast down all grades with gears in mesh and with the ignition turned off, thus giving the battery the full output of the generator.

I find this a great saving in gasoline, as well as on brakes. If the grades are very great, use the intermediate gear, thereby increasing the generator output to some extent.

This method can be used with good results on cars that overheat, as it keeps the fan working after the ignition has been turned off. Also, it will be found an advantage on most of the cars that use headlights extensively.—R. C. S., Tenn.

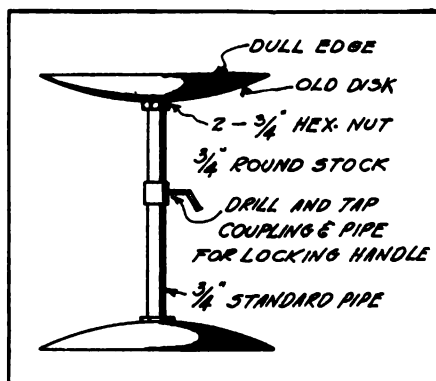
Ball Retainer Pliers.

If the points of a pair of long-nosed pliers are ground down to fit the holes in the ends of a ball retainer, it is very easy to remove and replace ball retainers in the cups. One of these tools will fit any retainer that has holes in each end, and is very easily made.—D. & F., Mo.

Convenient Tool Tray.

The tray shown in the illustration will be found very handy when working on an overhaul job. Both top and bottom of the tray is made from old disk blades. A piece of $\frac{3}{4}$ -inch pipe, about two feet long, is fastened into the base by means of two pipe lock nuts. The disk blade is clamped securely by screwing the nuts together.

A pipe coupling is screwed on the upper end of the pipe, and both coupling and pipe are tapped for the locking handle. The tray is fastened to a piece of $\frac{3}{4}$ -inch round stock by two nuts and the rod slipped into the



Handy When Working On Overhaul Job.

pipe. The blade used for the tray should be dulled to prevent injury to the hands.

It is possible to adjust the tray to any convenient height and lock it in that position by tightening the locking handle.—L. R. B., Iowa.

Valve Grinding Tool.

Use a rod 20 inches long and 5/16-inch or $\frac{3}{8}$ -inch in diameter. Bend at right angles, two inches from the end. Three inches from that bend, bend it parallel with

the first length. Three inches from the second bend, bend at right angles with the second length. Three inches from this third bend, bend again, lining the rod with the first length.

The last end will be between eight and nine inches long. Saw a split directly through the center of this end, 1- $\frac{1}{4}$ inches deep. Drill a $\frac{1}{8}$ -inch hole, $\frac{1}{4}$ -inch from the end, at right angles to the split. Heat this end and drive a flat piece of metal $\frac{1}{8}$ -inch thick into the split.

Hammer the sides into line with the strip between them. Cut the stem from a valve and drill a hole through the center of it, the same diameter as the rod. Countersink the hole on one side.

Make a collar with the hole the same size as the one through the valve head. Put it on the short end far enough down so that the valve head can be riveted on. Solder it in place, or drill a hole through both the collar and the rod, and fasten with a rivet.

For the bit, use large washers. Saw them in half. Drill a hole in the center of the halves to correspond with the hole in the fork end. File places to fit in the holes in the valve heads or sharpen, if necessary, to fit those having a groove in the head. Hold the bits in the split with cotterpins.—C. O.

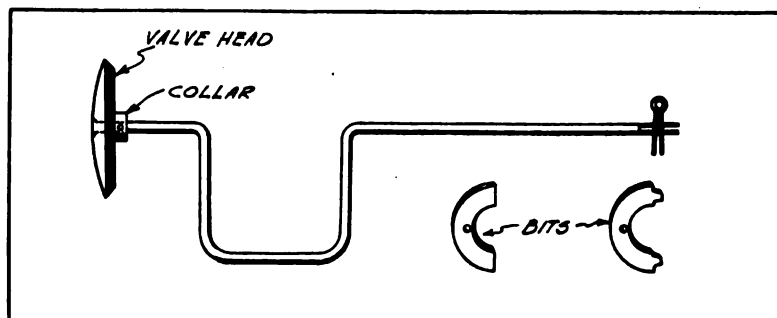
Detecting Defective Insulation.

Defective insulation on the various wires used on an automobile electrical system is often more or less hard to detect. This is especially true with high tension cables.

A tester that will serve very well for this purpose, and that will save much time, can be made from a coil and a coil of wire. The coil of wire, which consists of three or four turns coiled so as to allow the cable to be passed through it easily, should be fastened to the high tension coil terminal.

Current should be passed through the primary winding of the coil and the other end of the secondary coil grounded to one end of the wire to be tested. Then the wire should be drawn through the coil and any defects in insulation will be indicated by a discharge or sparking. A long wire can be tested very quickly and accurately with this easily made device.—E. S., S. Dak.

Useful
Home-Made
Valve
Grinding
Tool Made
From 20-
Inch Rod.



BRUNNER

$74/100$ of One Per Cent

Notwithstanding the broad guarantee
on all

BRUNNER Air Compressors

the combined service expense for
1921 including,—

Replacement of parts,
Repair work at our expense,
Traveling expenses,
Service on accessories we did
not make but do guarantee,

was .0074 of the Sales Volume.

It's the guts that count.
A Brunner has real guts.

Your jobbing salesman
will give you full details,
or write us for catalog.

BRUNNER MFG. CO.
UTICA, N. Y.

World's oldest and largest builders of Garage Compressors
Sales Offices: Utica, Cincinnati, Kansas City, San Francisco

Ask an Engineer

24 Well-Known Manufacturers of Automotive Merchandise Are Now Associated in the Culp Plan Group

(Which Should Increase Your Interest in the Following:)

THE Culp Plan is buying tires and tubes and batteries and spark plugs and grease and tools—everything you sell—for hundreds of Culp Plan dealers today.

When we say to a factory in whose goods we believe, "We are the purchasing agents for enough dealers to take your whole product; you can make 10% on your factory cost (and we pay cash)—eliminate all the burdensome sales expense you have been carrying"—when we say *that* speaking for all you dealers, that factory says, "Fine, we'll do it."

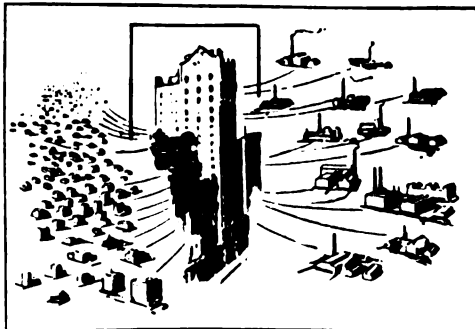
That minute that factory becomes *your* factory, as much yours as if it were behind the partition of your store. It is making your tires for your Culp Plan Store, with your own Culp Brand.

And that's all there *is* to the Culp Plan.

On one side is the tire dealer who knows exactly what his consumer wants. On the other side is the manufacturer making honest goods that will sell and stay sold on their merits. And between is George K. Culp, Inc., as the narrow strait through which the commerce of these two great oceans of production and distribution meets.

Now you can see why the Culp Plan is *not* a sales plan. We have nothing to sell except service to thousands of Culp Plan dealers, and enough Culp Plan Associated Manufacturers to supply the demand.

The Culp Plan manufacturer does not sell *us* a penny's worth of his merchandise. He sells direct to *you* and we buy for you.



The Culp Plan in Action

This message is primarily to dealers but, as part of the plan, you will want to know how the manufacturer benefits.

He gets a complete and constant distribution of his full production; a rapid and guaranteed profitable turnover on his working capital; complete and permanent protection against unfair competition; no more

Advertisement

You cannot thoroughly appreciate what these sensational prices mean to you, a local dealer, until you see the new 24-page Culp Plan Store Cost Bulletin No. 8, fully illustrated and complete in every detail, now ready for mailing. Make application for one on your business letterhead.



George K. Culp

long credits or adjustment abuses; a twelve-month year instead of a four-month year; and a permanent association in a national institution founded on *co-ordination and co-operation without competition.*

Our factories are making tires and tubes which for years have been favorably and nationally known—as fine merchandise as can be manufactured.

We "point with pride" to the list of our manufacturers behind whose products we put our Culp Plan Association Brand. The merchandise is standard, first-class—no seconds, no imperfect tires—only the merchandise you want.

It is only because we are working for so many "yous" that we can buy on the basis we do. The result is that you get merchandise at a cost that has never been approached in the history of the industry.

Nothing is added to the fac-

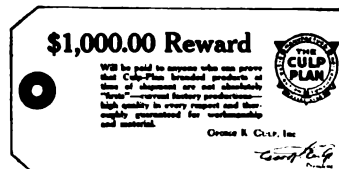
tory cost plus 10 per cent.

This is truly a sensational and revolutionary situation.

One Culp Plan Store in each sales area is the Culp Plan idea. That store will own the big share of the tire and accessory business in its territory. Because of its ability to undersell on the same merchandise that its competitors are offering who are not enjoying the benefits of the Culp Plan.

One of the biggest business builders the Culp Plan Store has is the Culp Plan Co-operative Buyers Franchise. It links the consumer and commercial accounts firmly into the Culp Plan Chain.

By this time you are wondering where we "get ours." A glance at the "get acquainted" agreement on the next page will give you an idea. Complete information on request.



The Consumer's Protection

Don't fail to read the next page. Fill out the "get acquainted" agreement, send to us and begin at once to get the benefits of the Co-operative Culp Plan. You are eligible to Culp Plan association under this "get acquainted" agreement if you buy *any* amount of automotive accessories for resale.

Continued on page 37

To Dealers Not Associated Under the Culp Plan:

(“CULP-PLAN” APPROVED PRODUCTS)

This agreement gives you full privileges of the Culp-Plan without permanent obligation, but does not allot exclusive territory. Therefore, upon examination of merchandise bought under this form of agreement, stores are urged to act quickly in forming permanent Culp-Plan association with exclusive rights. The permanent Culp-Plan Associate Store Agreement will be forwarded upon request, with full details of further privileges not enjoyed by stores operating under the “Get-Acquainted” form of association. Be a permanent Culp-Plan Associate Store before your neighbor “beats you to it.”

Pending the establishment of a permanent Culp-Plan Associated Store in your territory, the Culp-Plan “Get-Acquainted” form of agreement may remain in force indefinitely.

Take this simple, easy way of learning for yourself how the Culp Plan works. Fill out, detach and send us the agreement form below with your first order. This will instantly give you the benefit of the Culp Plan without obligation and make you a Culp Plan Associate Dealer. We will at once send you a signed copy of the agreement for your file together with price lists, special bulletins, order blanks, etc., etc. If you are not pleased with your initial order we don't want you to go on with us. This agreement is simply the putting of a meter on the line of your requirements. You pay for what you use.

THIS AGREEMENT ONLY APPLIES IN AREAS WHERE

THERE IS NOW NO PERMANENT CULP PLAN STORE!

GEORGE K. CULP, Inc.

56 West 45th Street

New York City

CULP-PLAN “GET ACQUAINTED” AGREEMENT

“SERIES 3”

This Agreement made the _____ day of _____, 1922, by and between George K. Culp, Inc., of 56 West 45th Street, New York, New York, (hereinafter called the Company), and

(hereinafter called the Store), in consideration of the mutual promises and agreements herein contained, WITNESSETH:—

This agreement shall make the Store an associate member of the Culp-Plan; it shall become operative on the date first above written and remain in force until terminated in the manner hereinafter provided;

The Company Agrees:

- (1) To act as Purchasing Agent for the Store; and to give the Store all the benefits of its factory affiliations;
- (2) To compile and mail to the Store bulletins listing merchandise available for purchase by Culp-Plan Stores;
- (3) The Company guarantees that prices quoted to “Culp-Plan” stores are net quotations as received from “Culp-Plan” associate factories, no profit, commission or other remuneration being added by the company;

The Store Agrees:

- (4) To adhere to terms and conditions of purchase as quoted in “Culp-Plan” Bulletins when making “Culp-Plan” purchases;
- (5) To pay to the Company, at time of placing orders, a commission of 2½% of the net amount of order placed;
- (6) To guarantee the Company a minimum service commission of Five Dollars (\$5.00) per month during the life of this agreement, as provided for in paragraph 5 of this agreement, whether earned by orders placed or not;

It Is Mutually Agreed:

- (7) That any advance or decline in costs affecting the price of “Culp-Plan” merchandise shall not be retroactive;
- (8) That this agreement may be cancelled by either party on fifteen days' notice in writing;

By

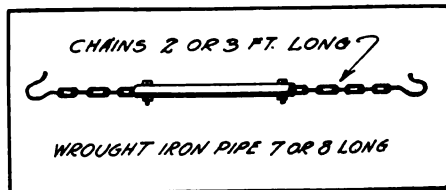
GEORGE K. CULP, INC.

President.

Gas-Pipe Towing Pole.

Towing a disabled motor car with a rope or chain is generally bad practice, owing to the danger of the car which is being towed jamming into the rear of the machine that is doing the pulling. This often occurs when the car ahead stops suddenly for some reason or other. By using a towing pole, these accidents can be avoided.

The pole is made of a section of 1-inch



Towing Pole Made From Gas Pipe.

or 1½-inch wrought iron pipe. A hole is drilled in each end, and two short pieces of chain are affixed to the ends of the pole by bolts through the holes and end links. The other ends of the chains have hooks so that they may be attached to the rear of the tow car and to the front of the disabled machine.—G. F. S., Ill.

Air Chuck Extension.

A piece of ¾-inch pipe, eight inches long, is slipped back into the air hose and the chuck screwed to the end of this pipe. Besides making an air-tight point, this affords a handle for holding the chuck.—R. S. C., Mo.

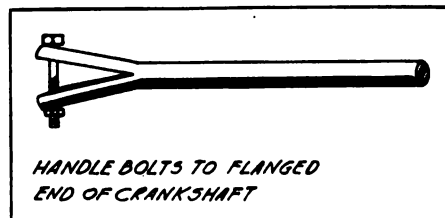
Takes Out End-Play.

The simplest and most permanent method of taking the end play out of Ford crankshafts is to substitute a middle main-bearing cap for the regular front one; that is, instead of using one center and one front main-bearing cap, two center caps are used.

This center, or middle cap, is slightly wider than the front cap—therefore, it must be dressed down with a file before it will work in the place of the front cap.—G. F. S., Ill.

Useful Handle for Fitting Bearings.

In fitting or scraping in bearings on an automobile motor that has been removed from the chassis, it is necessary to have



Rear-Radius Rod Makes Good Handle.

some sort of a handle attached to the crankshaft as a means to test the tightness of each babbit bearing adjusted.

A suitable handle is easily made for the Ford motor by utilizing a discarded rear-radius rod. The two holes on the forked end of the rod correspond with the holes on the flanged end of the crankshaft and, by

straightening out the rod and sawing off a portion of it, you will have the desired handle.

In some garages, it is the practice to use a large pipe wrench for this work, but this is bad for the wrench as well as being bad for the shaft.—O. M. C., Ill.

Handy Threading Device.

Having a quantity of small rods to thread and not having access to a lathe, we resorted to the following quick and easy method:

The die was started in the usual way, the die handle was screwed firmly in the vise, and the free end of the rod placed in the breast-drill chuck. By turning the drill instead of the die handle, the work was done in short order.

For larger rods, use the power-drill chuck and hold the die handle in the hands. D. & F., Mo.

Broken-Tipped Valve Cores.

Sometimes one of the tips becomes broken when removing the inner core, which means the replacement of a valve stem unless the broken one is removed.

I have found a device which will remove any inner core. Take the handle end of an old file and file it down until small enough to go into the valve stem. Then fasten the valve in a vise and punch the core in.

You can now take the four-in-one valve tool and ream out the inside of the valve and insert the new core. Later, the old core can be easily removed by cutting a small opening in the tube, which can later be vulcanized.

Saving the valve stem is saving money.—H. J. W., Iowa.

Locating a Defective Condenser.

A defective condenser is often rather hard to locate, especially when the car is not at the shop. An old condenser that is in good condition, and which is attached to two short leads, will prove very handy in any tool box.

If the condenser's condition is doubted, one side of the extra condenser can be quickly connected across the breaker points by means of the leads. If the trouble disappears, there is no doubt as to the other condenser.—S. E. G., Iowa.

Collapsible Water Bucket.

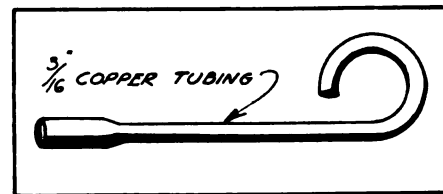
We find that, by cutting a section about a foot long from a 4½-inch or 5-inch tube and vulcanizing on one end of it, we have a very nice, compact, emergency water bucket.

Besides selling several of these to our local customers, we find that tourists who do not already have one of some make will almost always buy one. The beauty of this bucket for the dealer, is its low cost. It is made from junk which would otherwise be useless, takes only a few minutes of time and affords a nice profit.—I. R., Mo.

Valve-Pin Replacing Tool.

All cars having extra strong or heavy valve springs have round pins supporting the valves at the bottom with holder cups, which are more than the average mechanic will care to try to replace within an hour or so. It prolongs the time required for grinding valves and, in addition, causes lots of worry.

Take the pin, one for example, and by using a piece of copper tubing which is



Can Be Made to Fit Any Size Pins.

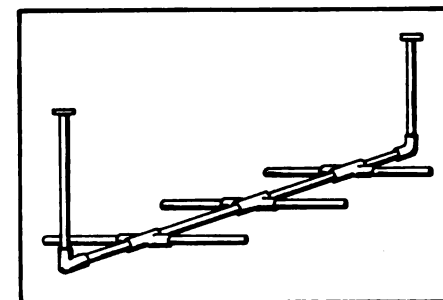
slightly smaller in diameter—3/16-inch almost fits all requirements—bend it as shown in the illustration. In the straight end—note the handle end—drive the valve pin. Some punch the size to make the hole the size required to allow the pin to go into the end of it slightly, fitting as loosely as possible so that it will be easy to draw the pin from the hole without drawing the pin from the valve after inserting.

Inserting the pin in the valve is very easy now, through the prongs of the valve lifter. As will be seen, the hole in the valve is straight in line with the slot through the valve tool. The tool can be made to fit any size pins. It is most desirable for Dodge, Overlands and similar cars.—G. F. H., N. C.

Tire Rack for Casings and Tubes.

The rack shown in the illustration makes an admirable place to store new casings or to hold casings and tubes that are to be repaired. It is made entirely of pipe and standard fittings.

Two floor flanges fasten the rack to the ceiling. A short piece of pipe extends downward from each of these and is fitted



Fine for Storing New Casings.

with a standard elbow. Standard pipe crosses, fitted with short lengths of pipe, connect these two elbows. Horizontal arms are made by screwing pieces of pipe into the crosses.

The rack may be made in a short time with the aid of a few pipe tools.—I. R. B., Iowa.

FEDERAL Electric Sign



Let Them Know You're in Business—

That is the only way you can get a big share of it—NOW. You must keep everlastingly asking the public to trade with you.

And, the most forceful, economical way to advertise your business and location to the hundreds of people who pass your store is to use a Federal Electric sign, such as shown above.

12 Months To Pay

A small payment brings you this wonderful sign. Beautiful blue and white porcelain enameled background — big, snow-white Silveray glass letters. Costs only a few cents a day for electricity.

Mail coupon for full information and price and free sketch showing how your Federal Electric sign will look. No obligation. Do it now.

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric)
at 8700 So. State St., Chicago, Ill.

Please send me full information, price and free sketch of Federal Electric Porcelain-Silveray Sign for my business. Explain your Easy Payment Plan. (A G A D-4)

Name.....City.....State.....

Street and No.....Business.....

Store Frontage.....No. of Floors.....

Federal Electric Signs are the cause of a busy street—not the result

Readers' Questions and Answers

Knock in Buick Six.

What would cause a knock in a Buick six? The knock seems to be in number six cylinder. The bearings are all tight and the car runs fine. It rattles worse when it starts and runs idle. It seems all right on the road.—E. E. K., Iowa.

There are many causes for knocks but, assuming that the bearings are all properly adjusted, I would expect to find your trouble to be either a piston slap or end play in the crankshaft. Either will cause a trouble such as you describe, but the piston slap causes a more or less metallic noise.

Clutch Will Not Hold.

In a 1917 Studebaker Six which I have, the clutch will not hold. I put in a new clutch band, coil spring and have tried two different bands. If the clutch pedal is held out it holds.—S. P. R., Mo.

Your question regarding the Studebaker clutch trouble is rather indefinite, but the following will probably enable you to locate the difficulty: Assuming that the clutch lining is in good condition and that the clutch is in line with the flywheel, it would seem that your trouble is due to lack of pressure on the clutch. Make sure the clutch pedal is free and not binding and thereby working against the clutch spring.

Next make sure that the spring is installed so that you are getting the maximum pressure and then, if necessary, increase the pressure by blocking up behind the spring by means of washers of a suitable size.

If the clutch facing is dry and hard, it should be soaked with neat's-foot oil. Then it may be dried out by sifting a little Fuller's earth into the clutch.

Positive and Negative Wires.

I have spent considerable time in getting information in regard to finding the positive and negative wires for a house lighting line of 110 volts. I wish to put a bank light of carbon globes in my garage to charge my battery.

I put salt in water and bubbles came from both wires. I also put electrolyte in water and again bubbles came from both wires. I have tried separating the two wires by a big bolt, making them about 12 inches apart, and still bubbles came from both wires.

A fellow workman told me that there are no + and - wires to a house lighting line. Is this right? If it does have a + and - please tell me some way to tell them apart.—G. W. W., Pa.

From your description of the tests you have made to obtain the positive and negative poles of the house lighting circuit, we should say that you have an alternating current instead of a direct current. With alternating current the poles are first positive and then negative, the rapidity of the change

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your business, the more you will know—and the more you know, the more money you will make.

Whether you are a dealer, a salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

ing depending upon the frequency of the current.

About the simplest way to find out whether it is an alternating or direct current is to call up your electric lighting plant or whoever has charge of a plant in your place using that current. They can readily tell you whether or not it is alternating. If it is alternating, you will not be able to use it for charging your battery without the use of a rectifier.

You might also make the same tests on your battery, which you state in your letter you have made with the lighting circuit. You will find that the tests check out as they should.

* * *

Off-Set in D-44 Buick.

I note in a Buick reference book for a late model that connecting rods are off-set from the center line, with relation to the bearings.

Please inform me through your columns if the D-44 Buick is the same in regard to this.—P. B., Minn.

There seems to be no offset in the connecting rods, from the center line of the bearings in this model car. However, care

should be taken when the pistons are installed on the connecting rods.

You will find a raised mark on the casting on the inside of the piston. This mark is in the shape of an arrow.

When the piston and connecting rod are assembled, the arrow on the inside of the piston should be located as directed in the reference book issued by the manufacturer covering this model car.

* * *

Removing Radiator Compounds.

I am a reader of the American Garage & Auto Dealer. Any information on the following will be appreciated:

I have a four-cylinder motor, cast in pairs, that has been overheating and I find that the two rear cylinders are stopped up.

A previous owner had been using several kinds of radiator compound and it has settled in the two rear cylinders. I have used several methods but failed to get any results.—E. W. S., Ill.

Probably the best method of removing radiator compound from the water jacket of an automobile engine is the steam jet. High pressure steam travels with a great force and also heats up the compound or loosens it.

If steam is not to be had, a stream of water under high pressure is probably next best. After the bulk of the substance is removed and the cooling system assembled, it might be filled with a strong lye solution and the engine run until hot. This solution will remove scale and other foreign substances, but should be drained within a short time and the system washed out very carefully.

* * *

Battery Positives and Negatives.

I am a reader of your magazine and find it very interesting, especially the chapter called "Practical Hints for Shop Mechanics"; also where they ask questions and you people answer them.

Now I have a question which I wish you would publish in your next issue.

How can you tell the positive side or pole of a storage battery when there is no mark on either pole?—V. M. Co., Pa.

Generally the positive of the battery is marked POS or (+) or is painted red, and the negative is marked NEG or (—) or is painted black.

There are two methods by which the positive of the charging circuit may be distinguished from the negative. These are as follows:

First Method: By a direct current voltmeter. The positive binding post of the meter is marked (+). When this is connected to the positive side of the circuit and a wire from the negative of the meter is momentarily touched to the negative of the

Make Your Store the Most Talked of in Your Town

The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En-ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.

It is **not** given away.

It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

There is absolutely no other way by which you can secure this sign. It and every one of the epigrams are copyrighted. There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

Write today for full particulars. Learn all about the Big En-ar-co Boy and Slate Sign, the epigram service, and the other advertising helps we give our dealers. Be the first in your community to get started. Use the Coupon. Use it Now!

THE NATIONAL REFINING COMPANY

National Headquarters, N-731 National Bldg., Cleveland, Ohio
4 Modern Refineries : 93 Branches

THE NATIONAL REFINING COMPANY,
N-731 National Building, Cleveland, Ohio

Without obligation to me please send full detailed information regarding the En-ar-co "Boy and Slate" and Epigram Service, and other advertising helps.

Name.....
Address.....
City..... State.....
I now sell..... Oil.



circuit, the meter hand will swing in the proper direction. If reversed, the hand will tend to go backward. Be sure the wire is touched only momentarily, because if a reversed connection is not broken instantly, the meter hand may be bent.

Second Method: Dip the ends of two wires, one from each side of the circuit, into a glass of water into which a teaspoonful of salt has been dissolved, but do not allow the ends of the wires to touch. Fine bubbles of colorless gas will be given off the negative wire.

* * *

Generator Voltage Too High.

I have a 1918 Maxwell with a Simms-Huff generator, 12-volt armature, 6-volt coil. I am not able to hold the voltage down. I have a 12-volt relay. The generator is retarded as far as possible. It throws 30 volts on the ammeter at a speed of 15 to 20 miles. A 5-foot copper wire winding was put in the circuit but it does not reduce the voltage.—S. P. R., Mo.

The high voltage of the system is undoubtedly due to the resistance coil on the switch panel being burned out. This regulating resistance is thrown in and out of the shunt field, cutting down the strength of the field and thereby reducing the voltage and amperage. If it has been short-circuited, there can be no resistance thrown in the circuit and the result will be very high voltage.

* * *

Replacing Bearing in Overland 90.

Would you please advise me by mail how I can place a new bearing on the flywheel end of the crankshaft of an Overland 90 engine and what equipment will be necessary?—W. C. D., Pa.

It is necessary to remove the engine from the car and disassemble it in order to tighten or replace the rear main bearing in an Overland 90.

The timing-gear case should be removed and the gear removed from the front end of the crankshaft. The bottom of the crankcase should be removed and then the connecting rods can be taken loose and the rear main-bearing housing unbolted from the crankcase. Next the crankshaft and rear main-bearing housing can be taken out through the rear end of the crankcase.

The bearing housing is made up of two halves which are held together by bolts and can be adjusted by removing the shims.

If there is any doubt about the condition of the old bearing, a new one should be used and fitted very care-

fully because of the large amount of work required to replace or adjust the bearing again. This job will prove rather difficult at several points and should not be undertaken by any one who is not a competent motor mechanic.

Usually, it pays to give the engine a com-

Now It's Your Turn.

In answering these queries concerning the difficulties arising in garage work, we have given the generally approved methods.

But we realize that many of our readers will have a different way of "doing the trick," and can offer interesting and helpful suggestions from a different angle. So we would like to have you tell us whenever you have a different method for handling these various questions.

Let's make this a Round Table for the exchange of ideas and thus be mutually helpful!

plete overhauling as it is practically disassembled. A hoist, a gear puller and ordinary hand tools, such as end wrenches, bearing scrapers and the like will be needed.

* * *

Diagram for 1918 Maxwell.

Will you please publish a wiring diagram for the 1918 Maxwell, to do away with the old switch panel and use the ammeter?—S. P. R., Mo.

We are publishing in this issue a diagram which will give you a method by which you can eliminate the panel on the Maxwell and substitute a 12-volt cutout with an ammeter in conjunction.

* * *

Horsepower for Belt Work.

I shall appreciate it if you can inform me regarding the following: I have a 1912 model Flanders 20 motor which I desire to use for belt work. Can you tell

me what horsepower I can expect and at what speed the motor should run?

Cylinder bore is 3½ inches and the stroke is about the same.—H. W. N., Indiana.

According to the S. A. E. rating, a 4-cylinder motor with a 3½-inch bore should develop about 21 horsepower.

As an automobile motor develops its maximum power at high speed, only a small portion of the maximum power can be obtained at speeds under which it will stand up on continuous load.

If you expect to load the motor heavily, we would not advise running it over 1,000 revolutions per minute and then you probably would not secure over six to eight horsepower.

The motor should be equipped with some sort of a governor so it will maintain a constant speed under varying load without attention from the operator.

* * *

Use of Battery Solution.

I would be pleased to receive information relative to the battery solution mentioned in the circular advertisement I am sending to you, and would also like to have you give me any information or data of standard tests or experiments which have been made by reliable chemical engineers or battery experts.

I am of the opinion that if said solution or any other solution is of benefit or an improvement to a battery, same should be made known to the battery owner.—E. A. M., Iowa.

According to a report from a laboratory analysis, the battery solution to which you refer is a liquid combination of hydrochloric acid and sulphuric acid. To use this the user dumps the solution out of the cell or cells which are very low and pours in the solution. This gravity reading is usually 1.240.

It doesn't change its gravity reading on charge or discharge.

A prominent Chicago servicing company has made the following statements to us

regarding the battery solution mentioned:

That it is a preparation generally used by irresponsible stations and second-hand car dealers who add it to the battery so that they can show the prospect that the battery is in good condition.

That it will in time eat the lead grids and usually affects the positive first.

That they personally do not, nor do the majority of battery men, recommend its use as, although it may give the momentary desired results, it will not be of permanent benefit.

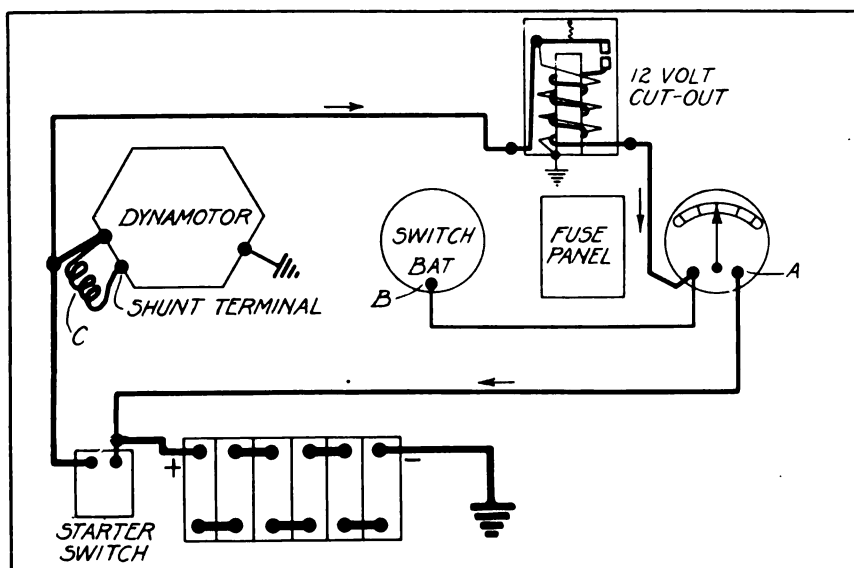


Diagram of Method for Eliminating Switch Panel on Maxwell Car.



Flexlume Signs— Give "Quality Atmosphere" To The Showroom

To the man buying a car an "atmosphere of quality" about the showroom means a great deal. In his mind he connects it with the car and the kind of service he will receive.

That is why it is so important that the sign—the first thing to strike the buyer's eye—should shout "quality" in every line. The way to attain this is to install a Flexlume Electric Sign, the kind with the raised, white glass letters. They are perfect day signs as well as night signs, they have greatest reading distance, lowest upkeep cost, most artistic designs.

Let us send you a sketch showing a Flexlume to suit YOUR particular needs.

FLEXLUME CORPORATION
25 Nail Street, BUFFALO, N. Y.

Flexlumes Electric Signs made only by the Flexlume Corporation



TURNER 2 in 1 TIMER

Has stood repeated and rigid tests for over five years and has proven a genuine quality article and a boon to every Ford owner. Increases power, insures an instant start in all weather, lessens fouling of two front plugs, saves gasoline and stops motor "kicking." Is oil, grease and water proof. Requires no oiling and is easily installed.

TURNER FOOT ACCELERATOR

For Fords. Gives positive and quick throttling and allows use of both hands in driving. Installed in 10 minutes by anyone. Simple and durable. Price, \$1.

SPRING SPREADER AND LUBRICATOR

Greatly increases riding qualities of any car, stops squeaks and spring breakage and increases spring wear. Makes steering easier and saves tires. The only device made that spreads spring leaves and lubricates them in one operation without fuss or muss. For all cars. Price \$2.50.

For convenience of car owner we furnish 1-lb. cans of special spring lubricant for use with our Lubricator.

Turner Manufacturing Co.
KOKOMO, INDIANA

Meet Competition Successfully

*and enjoy a
bigger margin
of Profit*



As in the past, we will continue to place our dealers in a position to compete successfully and still enjoy a larger margin of profit than ever before. A full line of standard make seconds direct from factory together with standard make firsts at greatly reduced prices.

We keep constantly in touch with our dealers.

Get on Our Mailing List

Write or wire for our latest Bulletin.

Broadway Tire Jobbers, Inc.
250 W. 54th St., New York City

OPERATION OF THE ELECTRICAL UNITS.

(Concluded from page 21.)

The repairman may possibly feel that a study of these formulas will not be of much practical use, but a little study will convince him that a clear understanding of Ohm's law will enable him to answer the following:

(1) Why will a starter winding allow several hundred amperes to flow and a generator winding allow a flow of only 10 or 15 amperes?

(2) Why must the starter cable be the size of your little finger, while the wires to the lights are about as large as the lead in a pencil?

(3) When two lamps are connected in series, why will one sometimes burn brighter than the other?

A cable of sufficient size must be used for replacement when it is necessary to change the position of a battery and increase the length of the starter cable between the battery and the starter. If too small a cable were used, the resistance would be so great that there would be an insufficient current flowing to the starter

| Gage A. W. G. B. & S. | Diameter, inches. | Area, cir- cular mils. | Gage A. W. G. B. & S. | Diameter, inches. | Area, cir- cular mils. |
|--------------------------|----------------------|---------------------------|--------------------------|----------------------|---------------------------|
| 0000 | .460 | 211,600 | 19 | .03589 | 1,288 |
| 000 | .4096 | 167,800 | 20 | .03196 | 1,022 |
| 00 | .3648 | 133,100 | 21 | .02846 | 810.1 |
| 0 | .3249 | 105,500 | 22 | .02535 | 642.4 |
| 1 | .2893 | 83,690 | 23 | .02257 | 509.5 |
| 2 | .2576 | 66,370 | 24 | .02010 | 404.0 |
| 3 | .2294 | 52,630 | 25 | .01790 | 320.4 |
| 4 | .2043 | 41,740 | 26 | .01594 | 254.1 |
| 5 | .1819 | 33,100 | 27 | .0142 | 201.5 |
| 6 | .1620 | 26,250 | 28 | .01264 | 159.8 |
| 7 | .1443 | 20,820 | 29 | .01126 | 126.7 |
| 8 | .1285 | 16,510 | 30 | .01003 | 100.5 |
| 9 | .1144 | 13,090 | 31 | .008928 | 79.70 |
| 10 | .1019 | 10,380 | 32 | .007950 | 63.21 |
| 11 | .09074 | 8,234 | 33 | .007080 | 50.13 |
| 12 | .08081 | 6,530 | 34 | .006305 | 39.75 |
| 13 | .07196 | 5,178 | 35 | .005615 | 31.52 |
| 14 | .06408 | 4,107 | 36 | .0050 | 25.00 |
| 15 | .05707 | 3,257 | 37 | .004453 | 19.83 |
| 16 | .05082 | 2,583 | 38 | .003965 | 15.72 |
| 17 | .04526 | 2,048 | 39 | .003531 | 12.47 |
| 18 | .04030 | 1,624 | 40 | .003145 | 9.888 |

Table of Wire Sizes.

to crank the engine. In other words, there would be too great a voltage drop between the battery and the starter.

The voltage drop in any circuit is the loss in pressure between two points in a cir-

cuit due to the resistance, of the circuit. This voltage drop must not be more than $\frac{1}{4}$ volt on a 6-volt system. The following formula can be used to determine the size of a starter cable that will not cause a greater voltage drop than the one specified:

(Length of wire in feet times 10.7 times number of amperes flowing) divided by $0.25 = \text{circular mils}$.

A circular mil is the area of a wire (1) mil in diameter. A mil is equivalent to 0.001 inch. After the number of circular mils are found, by referring to the accompanying table the gage size of the wire can be determined.

Problem: A certain starting motor draws an initial current of 300 amperes and the total length of the wires is six feet. What size cable should be used?

Solution: Using the formula just given, we have:

$$6 \times 10.7 \times 300 / 0.25 = 77,040 \text{ circular mils.}$$

Referring to the table, we find that 83,690 circular mils is the nearest larger size. This corresponds to No. 1 gage wire, or the size that should be used on this installation.

(To be continued)

Here and There in the Motor World

"Being Funny Is a Great Life," Says Chas. L. Archbold.

We always have a particularly friendly feeling for the one who makes us smile, and so Charles L. Archbold counts his friends by the thousands for it is he who supplies the wise and funny sayings for the grinning urchin who stands in front of gas stations and garages the country over, delighting passersby with his comical face and witty remarks.

Our illustration is a reproduction from a reprint of an interesting story which was published in a recent Sunday magazine section of the Cleveland Plain Dealer, and which tells how Mr. Archbold finds material for his epigrams and the fun he finds in writing them.

The "Epigram Service" has become very popular among the progressive dealers everywhere, for the boy with the "catchy," clever sayings is not only amusing—he's a mighty good salesman as well. People

get into the habit of watching for the boy's latest remark, and so the shop which has a "boy and slate" sign becomes the most looked for. They stop, look and

makes many new friends for his business.

The sign is over six feet tall, cut out to make it look natural, and supported by framework so that it can be set upon the

curb or wherever it will attract the most attention. The epigrams are a part of the sign service—enough of them being supplied for the entire year, giving you a new saying every other day.

The epigrams are always timely and interesting, as well as funny as, for instance, the following:

Crookedness never pays—look at the corkscrews out of jobs.

Making real leather is an honest skin game.

Uneasy lies the head that wears a frown.

Envy the bird—only one bill to take care of.

The following epigram made a hit on St. Patrick's day because of its timeliness:

With so many wearing green, things don't look so blue.

This one made an instant hit:

A four-party line is convenient for the other three parties.

A Man Who Makes Fun of His Business

The small man is full of wit. It's a short road that has no detour. The public he frequents in the street cars. All doublets are not alike. A green automobile sells more than a blue one. Many are dead but they don't die down.

By ALLEN M. SUMNER

HOW would you like to make a living by being funny? Charles L. Archbold, who probably holds the world's record for the number of funny things said, declares that the "being funny" life is a great one, and that only the first hundred are the hardest.

You've chuckled over his wit as it appears upon the slate of the pop-eyed school kid who stands before garages and gas stations. The kid has been standing there for about eight years and, judging by the number of folks who are chuckling at him and watching for his latest remark, he probably will be standing there as long as Charles Archbold can hold a pencil and see folks, for he declares that he can keep going just as long as he has his eyes and ears.

The boy giggles at the world in thousands upon thousands of spots the country over, but wherever he stands he says the same thing. He said to the "Cleveland Plain Dealer" under the "A" sign: "Why, I'm a humor product, born and educated in Indiana, where I stayed on a certain famous July 30. It read: 'Tomorrow is the Thirtieth First of July.' This was followed with: 'Think to me only with this eye.' Later prohibition hit me: 'Prohibition agents find too much whisky in whisky.' 'A watched pot will never boil.' 'Too many crooks spoil the law.' His liberal use of familiar proverbs and sayings which he turns into something different proves Archbold's statement that 'a comic effect is invariably produced when an unexpected or absurd idea is fitted into a well established phrase form.' 'Arch' also develops Bergson's idea of a comic effect obtained whenever one takes literally an expression used figuratively. Thus: 'They call it free verse, yet it is often prosed.' 'You won't be great by using a hammer just because Washington used a hatchet.' 'Even the fellow who invented spaghetti used the noodle.' 'We must clearly state, however, that 'Charlie' or 'Arch,' as he is most often called, makes no claim to formulating his sayings according to any philosophy of laughter and mirth. He tells his story something like this: 'I was a humor product, born and educated in Indiana, where I stayed almost necessary to have it appear at that very moment.' Another garage man sent him this: 'Hello, Arch! You almost got our town into a freer-all fight last week. You know your sign about 'Girls will be girls, and so will old women.' Well, it seems that on the very day that went by some fellow did was holding an indignation meeting about the way the girls of the town were carrying on. Right

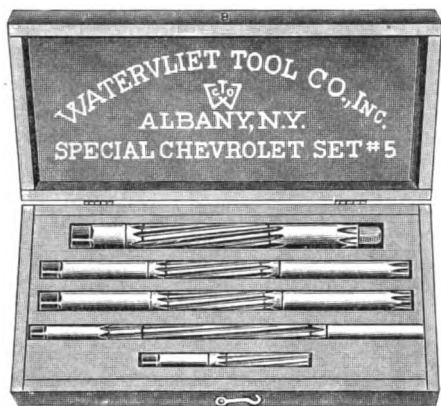
Here's the author of the sayings written on the sign's slate.

the country at large, some of his best things were done for safety campaigns. 'I'm through on religion, though,' says Mr. Archbold, 'and I never touch party politics. I once remarked that the word 'and' occurred only once in the Bible—and letters still coming to set me back to know it and what he keeps upon

It Was a Real "Scoop" for the Cleveland Plain Dealer When It Got This Live Story.

read these sayings—and then come back for more. In the meantime, the dealer gets the benefit of this unique publicity and

WATERVLiet SPIRAL REAMERS FOR CHEVROLET

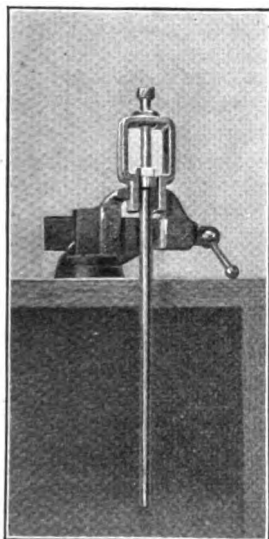


With this Chevrolet set you are equipped for a Spindle Bolt, Tie Rod Bolt and Piston Pin jobs on all Chevrolet models. Nicely packed in strong oak case.

THEY WILL NOT CHATTER
Ask Your Jobber. Literature on request

WATERVLiet TOOL CO., Inc.
Albany, N. Y.

The Dorr Miller Portable Hand Press



For Ford and Chevrolet 4-90 Cars

The new way to press differential gears off or on is the Dorr Miller way. The Dorr Miller Portable Hand Press is strong, light, inexpensive. The auto mechanic will readily see its numerous uses, such as the pressing off and on of connecting rod and wrist pin bushings, the straightening of parts, etc. This press does its work quickly, simply, well. No need for taking one or two extra men from repair jobs to help remove or replace a differential. The Press is clamped in your work bench vise and is ready for operation. Saves time, money, man-power and valuable space. Descriptive matter upon request. Price \$17.50 F. O. B. Defiance, Ohio.

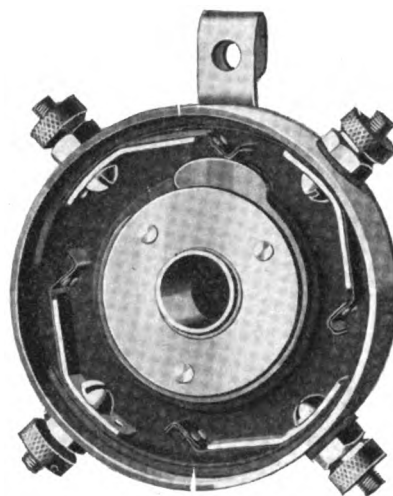
Sales representatives for the Dorr Miller Portable Hand Press are being appointed now. Fine opportunity for live, energetic young man. Liberal commission. Write before your territory is assigned, to Department of Sales.

**PYRAMID
EQUIPMENT COMPANY**

Manufacturers
and Distributors

126 CEDAR ST.
NEW YORK CITY

Automotive
Necessities



For Fords and Fordsons THE MAGNET DOES IT

General Efficiency

Designed by experts on automotive ignition the highest degree of efficiency has been attained in the

LEICH MAGNETIC TIMER

Special Features—

- Positive contact at high or low speed
- Not affected by engine vibration
- No contact points to clean
- No rollers
- No fibre raceway
- No attention needed after installation

Makes contact every time at the right time.

DEALERS: We sell the Leich Magnetic Timer on 30 days' trial. Fill in coupon below and get full information.

LEICH ELECTRIC CO.

Manufacturers of RADD Spark Plugs

GENOA, ILLINOIS

LEICH ELECTRIC CO.

Genoa, Ill.

Please send me complete information and prices on the Leich Magnetic Timer.

NAME

ADDRESS

Dealers who are interested in real business-building plans will find it worth their while to write the National Refining Co., K 731 National Bldg., Cleveland, Ohio, for detailed information concerning the En-ar-co boy and slate signs and epigram service.

Kendell Engineering Company Shows Rapid Growth.

The Kendell Engineering Co., of Fort Wayne, Ind., which is engaged in the manufacture of Kendell piston rings, has announced definite plans of expansion, having incorporated under the state laws of Indiana and now being known as the Kendell Engineering Corp.

Operations on a plant are to begin at once, as the extensive national business created warrants an immediate production. It is understood that several manufacturers are contemplating the use of Kendell piston rings on a standard equipment basis.

No changes in officials have been made, C. A. Kendall remaining president and engineer; Robert L. Kendell, vice president and sales director; and M. W. Cartwright, secretary and treasurer.

R. E. Warner General Sales Manager for Turner Mfg. Co.

The Turner Mfg. Co., of Kokomo, Ind., is announcing to the trade the appointment of R. E. Warner as general sales manager of the company. Mr. Warner will have the direction of sales of all Turner products.

To many dealers in many parts of the country Mr. Warner will need no introduction. For the benefit of those who do not know him, it may be said that he is a man of wide experience in the selling business and of wide acquaintance in the automotive trade.

Reports from the Turner Mfg. Co. indicate a continued steady growth in sales. Not only are the sales steadily mounting through their representatives throughout the states, but exceptionally good export markets have been opened up during the past few months.

The Turner line of automotive accessories is established as a standard with good dealers all over the country. Starting as it did with but one product—the famous "Two-In-One" timer—the line has grown to four successful and fast selling accessories. The sales on the Turner Ford foot accelerator, spring leaf spreader and lubricator and safety lighting wire assembly have been nothing short of remarkable, considering the length of time that they have been on the market. The timer, now in its fifth year, has exceeded all expectations of its creator, Earl Turner, in point of sales.

Without question, both the automotive trade and the Turner Mfg. Co., will greatly benefit by the energy, experience and general sales knowledge of Mr. Warner.

H. K. Wheelock Resumes Management Western Vulcanizer Mfg. Co.

The Western Vulcanizer Mfg. Co. of Chicago, announces the return of H. K. Wheelock as managing head of the business. A year ago, Mr. Wheelock relinquished management of his company to rest and to regain his health. W. J. Jarratt, who took over the business during Mr. Wheelock's absence, has now retired. Mr. Wheelock is again in complete charge and the business is forging ahead with renewed vigor. There are a number of new plans and new products in the course of development at the present time.

The Western Vulcanizer Mfg. Co. was



H. K. Wheelock Again Managing Head of Western Vulcanizer Mfg. Co.

organized by Mr. Wheelock on the west coast, at Los Angeles, in 1917. It was from the fact that the company was located on the western coast that it took its name.

Mr. Wheelock pioneered the Dri Kure vulcanizing method which, it is said, has been of inestimable service in tire repair-work in the short space of a few years.

A year after this company was founded in Los Angeles, the demand for Dri Kure equipment from Eastern and Middle Western states became so great that the company started another plant in Chicago. This brought it closer to the source of material supplies and to the center of the market. Since that time, the Western Vulcanizer Mfg. Co. has occupied quarters at 148-158 No. Desplaines St., Chicago. Very soon it will be necessary for the firm to seek more commodious quarters.

One of the striking features of Western Dri Kure equipment is the wood end block. This is an exclusive patented feature of Western Dri Kure vulcanizing equipment. The wood end block is designed to eliminate bumps or thin places at the end of the sectional cures and to prevent any porous, spongy areas at the end of the laps.

Among the new plans already announced or projected are three that are particularly worth mentioning:

1. A new consumers' discount. This makes Western Dri Kure equipment available at very attractive prices.

2. A new service plan to firms which are already established in the tire repair business—or to men thinking of going into the business—has been perfected and is now being generally offered.

3. The Western Vulcanizer Mfg. Co. will soon be able to announce an item of new equipment which it believes will find a ready market in every tire shop of the country, regardless of the style of their present equipment. This will be in the nature of additional equipment and will render foolproof an important phase of vulcanizing.

Shaler Patents Again Upheld by Decision of Minnesota Court.

Litigation involving patents covering solid fuel vulcanizers and controlled by C. A. Shaler Co., of Waupun, Wis., has finally been brought to a conclusion by a decision rendered by Judge Page in a suit brought in the Minnesota district against Loren Risk et al., doing business as Risk's Riskless Vulcanizer Co.

These patents have been in litigation for several years in various districts, there being at one time as many as 35 infringements on the market.

George K. Culp Making a Trans-Continental Motor Trip.

George K. Culp is going to spend the next three months calling on Culp plan associated stores throughout America, in the interest of the Culp plan association of stores and factories which has now become a very important operation in the automotive field.

Twenty-four nationally known manufacturers of tires, tubes, storage batteries, spark-plugs, tools and accessories of all kinds make up the Culp plan associated manufacturing group. There are now Culp plan associated stores in every state in America, dotting the map from coast to coast.

The Culp plan association slogan is: "A Culp plan associated store in every town in America in 1922."

Dealers in automotive accessories will do well to write George K. Culp, Inc., 56 West 45th St., New York City, for a copy of the Culp plan, cost bulletin No. 8, which should prove a revelation to the trade.

Paragraph.

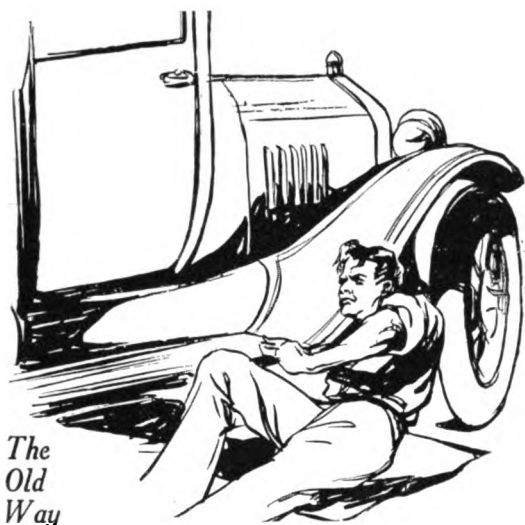
WATERHOUSE WELDING Co., Boston, Mass., has issued a catalog, giving specifications and prices of Waterhouse pistons, wrist pins and piston rings for passenger cars, trucks, motorcycles and motors. It gives complete specifications on practically every automobile piston, pin and ring used in any automobile or truck.

No More Crawling Under Your FORD

Oil Adjusted From Driver's Seat

NO DIRT or GREASE

NO TROUBLE



*The
Old
Way*

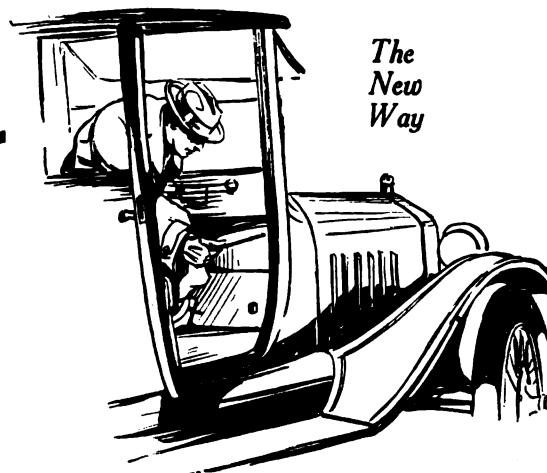
ELIMINATE THIS

FORD DEALERS everywhere greet **Schaefer Oil Gauge** with great enthusiasm. They appreciate its acceptance by the **Ford owner** as his best assurance against **Burnt Out Bearings**; and as a reducer of expenses, a sure eliminator of trouble and a good preserver of clean clothes. It has many appeals for the Ford owner and these are but a few of the numerous reasons why **Schaefer Oil Gauges** sell themselves.

ALL OIL TROUBLE ELIMINATED

The **Ford owner** usually guesses at his oil supply. He just hates to creep under his car with a pair of pliers, twist open the two pet cocks to find out how the oil supply stands. He relies upon guess work and guess work is usually wrong. The result is burnt out bearings and cylinders full of carbon. Show him **Schaefer's Oil Gauge** which will eliminate all troubles; show him how simple it will be to unscrew the rod from the toe board, lift it up

With
**Schaefer
OIL
WATCH**



*The
New
Way*

FOOL-PROOF and HANDY

and see at a glance whether his oil is at the proper level or not. No stepping out of the car. No creeping under it. No dirty work and no more oil trouble—the full facts in a few seconds.

EASILY INSTALLED

Installing the **Schaefer** is so simple that he can do it himself. Simply attach it to the crank case in place of the lower pet cock, bring it up through the toe board and everything is set. No further trouble with oil supplies will be experienced.

ABSOLUTELY ACCURATE

There is no complicated arrangement which can get out of order and mislead him. What is read on the rod is the **exact** amount of oil in the crank case. The **Schaefer Oil Gauge** cannot lie because there is absolutely nothing which can get out of order.

DEALERS: You will want to carry **Schaefer Oil Gauges** in stock so that you will have them when asked for. They retail for only \$2.50. (Write for particulars about our attractive dealer proposition.)

Mail This Coupon Today

Philip Schaefer & Company

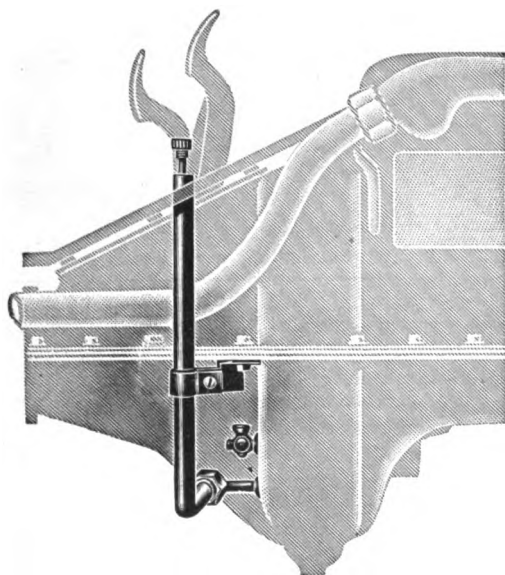
20 E. Jackson Blvd., Chicago, Ill.

Please send me your dealer proposition:

Name

Address

Jobber

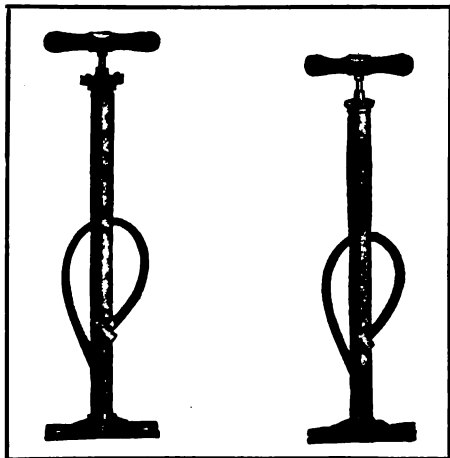


Accessories—Dealers' Key to Profits

There's an Autoquip to Suit Your Most Exacting Customer.

It's all right to sell one line if you can be assured of having a size, style and price that will suit each customer. You can have all these, it is declared, in Autoquip pumps.

For instance, there is the No. 21 Paramount which is a high-grade, single-acting and easy-operating pump. It is fitted with brass tube, 1½ inches long and nickle-plated.



No. 21 Paramount and No. 31 Peerless Autoquip Pumps.

The handle is of black, rubberized enamel.

A Lox-On Jr. air chuck, brass check valve and heavy reinforced base complete the equipment of the pump. Its length is 21 inches over all.

Then there is the No. 31 Peerless. This pump is equipped with a large brass, ball-check valve and large, heavy reinforced base which has special ground grip flanges. The steel barrel is anchored into the base by a patented process. Other features are the quick acting air chuck, heavy C. I. tubing and a black, rubberized finished handle that is locked to the rod by double-jam nuts.

These are only two from the very complete line of reliable pumps which the Autoquip Mfg. Co. is offering to garagemen and dealers who are interested in supplying their customers with the equipment that gives satisfaction.

The same company is marketing a large and complete line of lock-type anti-rattlers. Owing to the rapidly increasing number of enclosed cars, the demand for this accessory is growing daily.

Autoquip window anti-rattlers are designed to stop all rattling and chatter and are made in four sizes for all cars, and a special for Fords.

Made of brass and heavily nickel-plated, they harmonize well with the car's interior decorations and will not rust. Autoquip anti-rattlers are easily attached and hold the glass tightly, a rubber button bearing on the glass window.

Jobbers, dealers and others interested can obtain prices and full details concerning Autoquip pumps and anti-rattlers by writing the Autoquip Mfg. Co., 495 St. Paul St., Rochester, N. Y.

Lend Wings to the Ford By Installing Spad Timer.

It was in the early part of 1921 that the Spad timer was put upon the market, after several years of study and experimentation in the timer field.

After thoroughly demonstrating the efficiency of this timer for a period of over a year, during which time it has been sold to many dealers throughout the United States and in foreign countries because of its many good features, the manufacturer has now entered into a very large production which permits the sale of the Spad timer at a greatly reduced figure.

This has been done without in any way sacrificing the quality of the product. In fact, declares the manufacturer, some minor improvements have been made which make it a finer operating and easier selling article than it was during the past year. The following details of the Spad construction are worthy of notice:

All possibility of accidental short circuit has been done away with, it is said, by making the entire timer of magneto material, which is a hard rubber insulating compound.

By abutting the brush holders of the Spad from a central portion of the shell, the gummy mixture formed by the combination of oil and grit which oozes out through the camshaft is kept away from the contact surfaces. When this combination of oil and grit is permitted to cover the contact surfaces, it insulates them to such an extent that either a weak spark or none at all results.

With the Spad timer, it is said that it is utterly impossible for oil to reach the copper carbon brush contact surfaces. By using a smooth disk rotor, which revolves at high speed, any oil that might normally rest there is thrown from these surfaces. By keeping the contact surfaces clean, a conductive path of very low resistance is insured. Thus an exceptionally hot, fat spark is attained, with all the resulting advantages of precise and powerful ignition. By using phosphor bronze springs, with soldered connections, throughout the entire brush assembly, floating contacts have been avoided, so that this also is a highly conductive path.

The shell of the Spad contains four brushes instead of four contact plates. The brushes are the only parts subject to wear and can easily be replaced, but will wear for more than one year.

A wabby camshaft will not cause wear of the Spad rotor, for it is a flat disk which has no moving parts and wears in the same proportion as the brushes, its normal life being over one year.

Loose, broken or moving connections will greatly interfere with the passage of current. The copper carbon brush of the spad is soldered to a phosphor bronze spring, which is soldered to the brass screw that acts as a binding post of the timer and making solid connections throughout its construction.

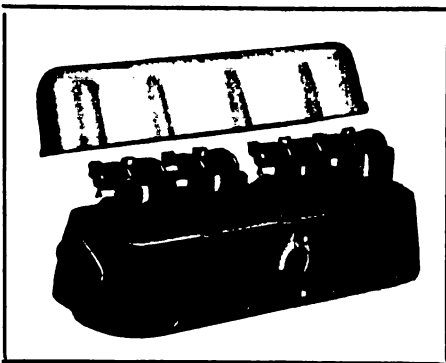
The Spad timer has so many good points that you will want to know more about them. Ask the Spad Mfg. Co., 42-B West 39th St., New York, N. Y., to send you particulars as to the unusually attractive dealers' and distributors' discounts they are offering.

Frontenac Cylinder Heads—Designed by Famous Racing Drivers.

The man who wants to add real performance to his Ford car will be interested in this illustration of the Frontenac cylinder head, 8-valve overhead type.

The Frontenac cylinder heads are made in three models—the difference being in the size of the combustion chambers. This, it is said, will eliminate a compression knock on some models of Fords and a loss of power on other models. The three models are:

Model T head for Ford roadsters, touring cars, coupes, sedans and trucks, which includes the following equipment: Choice 1¼-inch horizontal carbureter, Zenith, Stromberg, Schebler, Rayfield; vacuum



Frontenac Cylinder Head, 8-Valve Overhead Type Designed by Racing Drivers.

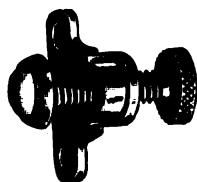
tank; gasoline lines; dash controls; hot-air stove and tubing; spark-plugs and ignition wires.

Model S head for a Ford converted into a speedster, equipment same as for model T head.

Model R head for a Ford converted into a racing car.

Louis and Arthur Chevrolet, world-

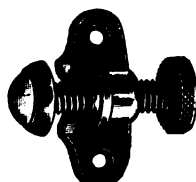
LOCK-TYPE ANTI-RATTLERS



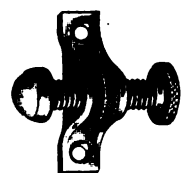
No. 503. For Fords, made with Hump that clears all mouldings. List price, \$.25.

DEALERS:
Sell this long-needed useful device.

The demand for Lock-Type Anti-Rattlers is growing every day, due to the increasing number of enclosed cars. A display card of Autoquip Window Anti-Rattlers will bring sales, because:



No. 504. L Base fastens on mouldings. Used on any car. List price, \$.25.



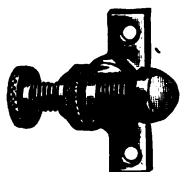
No. 505. Original Lock Type with Positive Lock action. List price, \$.35.

1st. They are effective; stop all rattling and chatter.

2nd. Well made, — of brass heavily nickel plated and will not rust. Rubber button bears on window glass.

3rd. Easily attached.

Mounted on display cards of ten each. Packed fifty to carton. Write for discounts today.



No. 506. Swivel Lock Type especially made for sliding windows. List price, \$.60.

Autoquip Mfg. Co., Inc.
Rochester, New York

Manufacturers of
AUTOQUIP PUMPS

The Biggest Battery Value on the Market — at Less Cost

Dealers and Service men find it the easiest to sell and more profitable.

**"A STEWART they say—
keeps trouble away."**

STEWARTS assure greater satisfaction, more power and longer life.

Built to a principle of SERVICE and backed by TWO-YEAR WRITTEN GUARANTEE.

Wide-awake dealers are selling STEWART Batteries—and more every day—why not you?

Delay will mean loss of nice trade.

Stewart Storage Battery Co.
MARSHFIELD, WIS.



Our exceptional selling plan and sales co-operation offer one of the biggest inducements ever known in the automotive line. Your territory may be open. We want to meet dealers alive to STEWART'S exclusive agency sales plan. Write us today, stating your business responsibility complete.



Results tell the tale

A perfectly made piston ring, equally efficient for compression and oil troubles, with an oil-sealing, oil-controlling channel, the only one with outlets to release excess oil, preventing clogging. The "self-sealing" surface fits itself to out-of-round cylinders. 3 rings are installed on each piston.

Satisfying Motor Car Owners

When replacing piston rings for motor car owners, the main object of nearly all dealers is complete satisfaction. Dealers realize that this policy, in the end, means more profit. For a satisfied customer, especially where his car is concerned, is a real asset.

This is one of the big reasons why, more and more garages, dealers and repair men are installing TELL-TALE rings. They find that these rings produce the utmost satisfaction.

There are four good reasons why TELL-TALE rings are ideal for replacement:

- 1—TELL-TALE Rings fit slightly out-of-round cylinders in a very short time—less than 100 miles of running. This is because they have a serrated surface, a distinct feature of this ring, not found in other rings. TELL-TALE Rings prevent compression leakage, hence increase power and save gasoline.
- 2—The TELL-TALE Oil-Controlling Channel does not run into the joint. Therefore Oil cannot work in back of the Piston Ring. This Channel is absolutely non-clogging, because:
- 3—There are outlets in the TELL-TALE Channel, which are an exclusive feature. Oil fills the Channel on the down-stroke, entering through these outlets. The Channel empties on the up-stroke through these outlets, except for the film of oil necessary to seal in compression.
- 4—The TELL-TALE Ring is a one-piece ring made of the finest grey iron. It is easily installed and guaranteed accurate. Can be secured in any over-size.

Write for Descriptive Folder and Discounts

Complete descriptive folder, "The Balance of Power," will gladly be sent on request. Address factory or nearest Distributor listed below. Good discount to Dealers and Repair Shops. We also have an especially attractive Service Station proposition for responsible Dealers who will carry a small assorted stock. Ask for details.

St. Louis Piston Ring Corp.

1808 S. 2nd St.

St. Louis, Mo.

Principal U. S. Distributors

Tell-Tale Piston Ring Sales Agency, 1512 Vine St., Philadelphia
Bearings Specialty Company, 160 Massachusetts Ave., Boston, Mass.
Frank W. Wood Co., 70 West New York St., Indianapolis, Ind.
Lynskey, Neal & Lynskey, 3302 Bigelow Blvd., Pittsburgh, Pa.
Acme Piston Ring Co., 2017 S. Michigan Blvd., Chicago, Ill.
The Standard Metal Goods Co., 2080 E. 30th St., Cleveland, Ohio
The Motor Industry Specialty Co., 1807 McGee St., Kansas City
The Miller-Wiegand Co., 217 N. Main St., Dayton, Ohio
Canadian Distributors, The Standard Metal Goods Company
170 King St., West, Toronto, Ontario, Canada

TELL-TALE
TRADE MARK
PISTON RINGS

famous racing drivers and engineers for a score of years, are the designers, patentees and makers of the Frontenac cylinder heads for Fords.

Complete details, prices, etc., may be had upon request from Chevrolet Bros. Mfg. Co., Indianapolis, Ind.

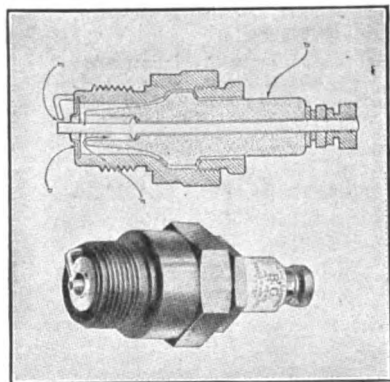
"The Plug That Cleans Itself"—A New B. G. Product.

The B. G. Corp., of 35-D Gold St., New York City, after making a name for itself in the airplane field as the manufacturer of the B. G. aviation spark-plug, has announced that it is bringing out a new product in a B. G. plug for automobile use. Like the B. G. plug, which has become famous for its efficiency in aviation, the new automobile plug is known as "the plug that cleans itself."

B. G. plugs are guaranteed against short-circuiting from carbon and against fouling by oil. These features not only eliminate one of the most troublesome problems of the motorist—that of frequent cleaning of spark-plugs—but it is said that they also insure perfect efficiency and so increase gasoline mileage.

A special feature of the B. G. plug is the little "hot spot" monel metal disk, *D*, which heats at the first explosions and remains hot. Together with the electrodes and the porcelain, it is at a temperature that conditions the fuel at the sparking points and within the plug, by breaking up the globules of oil and gasoline in freely-burning vapor. Consequently, when ignition occurs, the vapor inside the plug, which serves as a primary combustion chamber, not only burns cleanly—leaving no carbon—but projects a flash of fire into the cylinder. This shot-gun flash scours the firing point and compels complete ignition.

The complete conditioning of all fuel and oil in and about the plug, combined with the shot-gun method of producing combustion, absolutely prevents all car-



"The Plug That Cleans Itself."

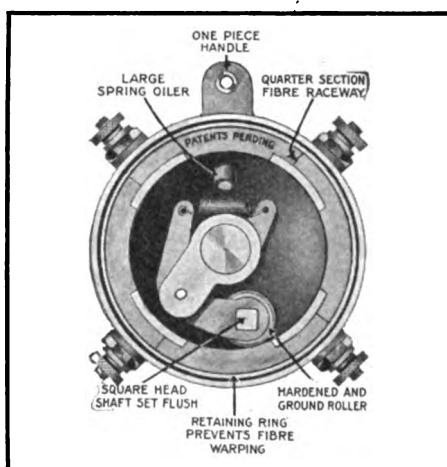
bonization of the sparking points, it is said. Even in cold weather, the B. G. disk heats up with the first few explosions, forming a "hot spot" which allows a cold motor to run evenly and develop full power almost instantaneously.

You'll Like the M & R Timer—It's a Quality Product.

With a view of meeting the demand for a high-grade article at a popular price, the M & R timer has been designed and, in attaining this end, neither quality of material, construction or finish has in any way been sacrificed.

Four sections of the finest, naturally-seasoned, rock-grain fibre form the raceway, which is a patented construction. Quarter sections, as made by the McCulloch Mfg. Co., 216 High St., Boston, Mass., which manufactures the M & R timer, are cut against the grain.

The retaining ring binds the four-piece raceway and, in combination with the fibre washer fitted around the contact post where it goes through the shell, keeps the raceway absolutely rigid so that the posts cannot



M & R Timer Contained in Steel Ring Which Prevents Warping.

touch the shell and short-circuit. It is contained in a steel ring, which prevents warping.

Of the spring-top type, the oiler is self-closing and of sensible size. It is nickel finished.

A one-piece handle is securely attached to the shell.

The contact segments—which are made of a steel which is specially prepared to stand wear equal to the fibre raceway—cannot work loose.

The brush assembly is accurately machined and assembled so that the roller will bear squarely on the contact segments, assuring absolute contact at all times, particularly when running at low speed.

Carbon steel, hardened and face ground true, hole drilled and reamed, is used to make the roller of the M & R timer, while the spring is made of high-grade piano wire and is flexible but strong.

Thorough tests are made, when assembling M & R timers, so that no defects in construction may be overlooked. The

shell is gaged for size and roundness, each contact post is tested separately for short circuit and, as a final check, the complete timer is mounted on a shaft as it would be on the car.

Every M & R timer is fully guaranteed against defects in material or workmanship and to give perfect satisfaction.

This Booklet Tells You What You Want to Know.

Under the title: "Reseating, Refacing—A Treatise on Preparing Worn Motor Valves for Regrinding," the M. B. Skinner Co., 562 Washington Blvd., Chicago, is issuing an unusually interesting booklet.

This booklet deals with the details of valve reseating and refacing, presenting clearly and in detail, with appropriate illustrations, the various steps to be taken in refacing and reseating.

Jakknife Visor Cuts Off Glare and Avoids Confusion.

Motorists frequently find night driving dangerous and confusing because of the reflected lights from approaching cars and the bright arc lights with which the roads are illuminated.

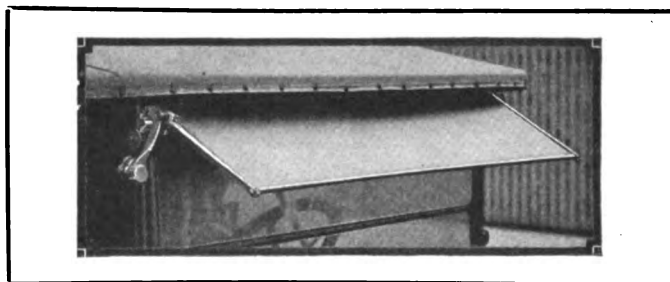
The Jakknife windshield visor has been designed to cut off this glare and confusion. With it attached to the car, the motorist sees the wheels and not the lights of an approaching car, the road and not the arc light.

The Jakknife is tightly attached and is non-rattling, and is so constructed that it may be adjusted to any driving angle.

When not needed, it runs back on a roller-like shade, the arms folding back out of sight and making it inconspicuous. It can even be used with the top down on open cars.

The Jakknife is made of solid bronze castings throughout all exposed parts. It is machined and finished accurately with modern tools, ground plated and polished for the nickel finish, or polished, rust-proofed and japanned for a black finish.

Heavy black top material, which will not

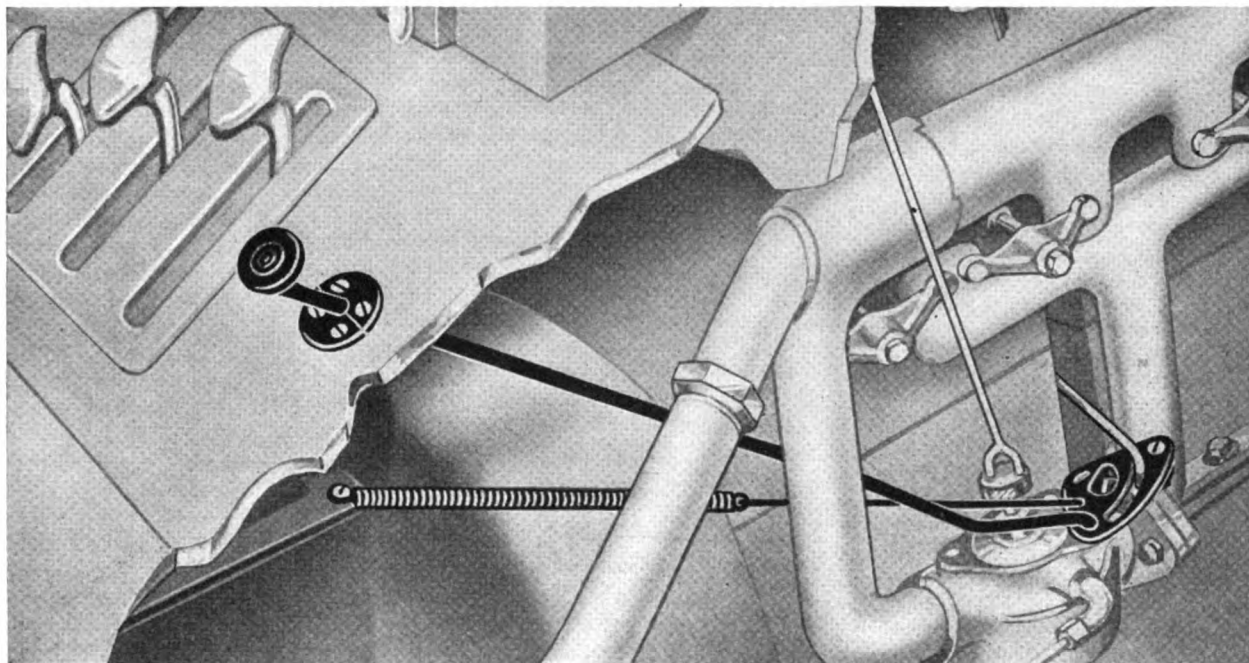


Jakknife Visor Tightly Attached and Non-Rattling.

crack or warp and will hold its position permanently under the tension of the spring roller, is used to make the curtain. The under side is a soft shade of green, which is restful to the eye.

Prices and descriptive literature may be had upon request from the Roberts Mfg. Co., New Haven, Conn.

The EWALD Foot Accelerator for Ford Cars



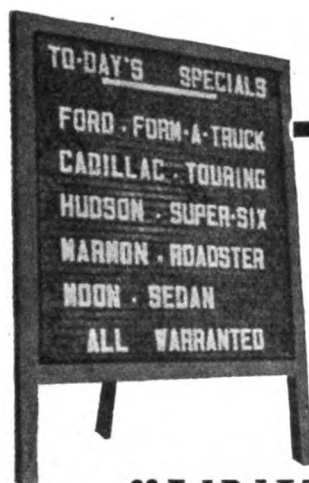
The Best—the Cheapest—and in every way the most successful Foot Accelerator ever made for Ford Cars. No Ford owner should be without one.

Dealers and Jobbers—Write our sales department today for full details.

Manufacturers
ROMORT MFG. CO.
OAKFIELD, WIS.

Price 75 Cents

Sales Department
THE ZINKE COMPANY
1329 Michigan Ave.
CHICAGO, ILLINOIS



We Sell Your Used Cars

—and you know it's the hardest problem in the business today to keep them from stacking up on your hands.

"UNITYPES"

actually sell them for you—besides they bring new customers off the street into **your** place—to **buy**—

You could afford to invest in ten or twenty of them,—but you don't need to—one or two will dress up your window and be live, silent salesmen as well.

In use all over the world.

Made in many styles and at prices from \$3.50 up.

Ask for catalog "A. G.-20" applied to Auto Dealers.

W. L. CLARK COMPANY, Inc.
538 Pearl Street New York
Patentees and Exclusive Makers.

Get a real equipment

NOW is the ideal time to start in the tire repair business. The discontinuance of tire guarantees means more work for the vulcanizer. You can enjoy a big, profitable, permanent business if you have the right kind of equipment.

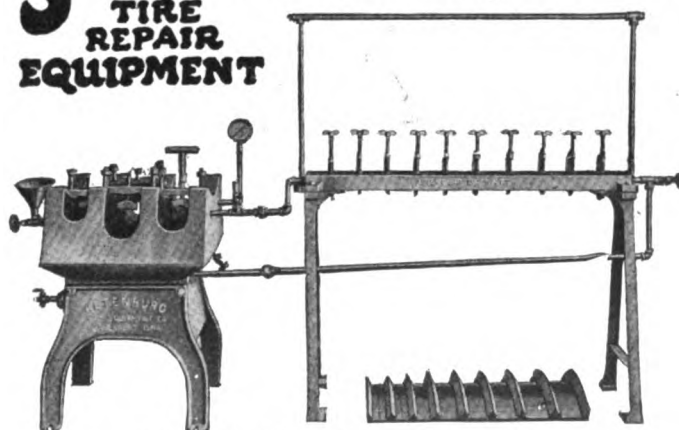
SEARS DAVENPORT equipment will enable you to dominate the tire repair business in your locality. Simple, easily operated, economical, requires no upkeep, lasts a lifetime.

Don't wait—be a go-getter.
Write us today for full data.

Sears-Tire Equipment Co.

Davenport, Iowa

Sears-Davenport TIRE REPAIR EQUIPMENT



C-18 Outfit—Price with gas burner, \$246.50

Up-to-the-Minute Garage Equipment

A Puller That Fits Any Type Wheel or Gear.

It is said of the Frisz wheel and gear puller that it is just naturally built to sell itself. It is simple to demonstrate and is quickly comprehended.

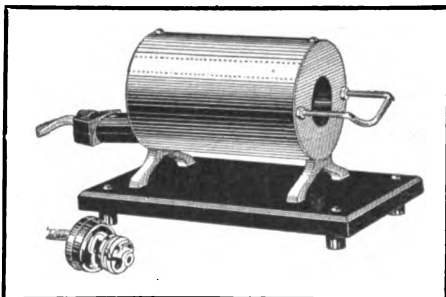
Frisz wheel and gear pullers are made in three sizes which will take care of the smallest as well as the largest types of wheels and gears. They require no special attachments and are made of the finest materials, with added factors of strength where stresses come heaviest.

It's hard to shake a bulldog's grip—but not as hard as it is to shake the gripping fingers of a Frisz wheel and gear puller. Whether expanding or contracting, the grip is automatic. The arms are drop-forged, high carbon, nickel steel, and are always parallel with the power screw, with the pull always in a straight line.

Descriptive literature and prices will be forwarded to all interested by the Frisz Mfg. Co., Inc., Indianapolis, Ind., upon request.

Frisz Electric Furnace Small in Size—Mighty in Use.

A small but mighty device, which has many applications for the mechanic, is to be had in the Frisz electric furnace which



Frisz Electric Furnace Easily Portable.

is now being marketed by the Frisz Mfg. Co., Inc., of Indianapolis, Ind.

"It gets hotternheck in a jiffy," says one enthusiastic user of the Frisz furnace. More than that, it stays hot at a cost of less than five cents per hour and there is no fire danger. One or two soldering

irons may be used at the same time.

Besides heating soldering irons, this furnace will melt babbitt for bearings, heat rivets red-hot in ten minutes, temper tools or heat-treat metals. It gives 1,500-1,600 degrees of heat constant and will not burn out.

The Frisz electric furnace is easily portable and fits any electric socket. It can be supplied in two models—model A, with a current consumption of 240 watts; model B, with a current consumption of 400 watts.

You will want to know more about this convenient, efficient and durable shop helper. Full particulars may be obtained from the Frisz Mfg. Co., Inc., Indianapolis, Ind.

"Steers Easy." That's Strickler Oil and Grease Gun Lubrication.

Starrett was giving instructions to his new mechanic and, being thorough, he was omitting no detail of the methods which had made his shop known for its service.

"There is one thing you must give special attention," said he "and that is to see that each car we service has thorough lubrication."

"Some fellows I've known thought their duty to their customers ended with the greasing of the grease cups and caps. We don't do things that way here. Thorough lubrication in and through all bearings is necessary in order that we may assure our customers the easy steering, smooth running and consequent safety, comfort and economy that makes lasting friends for the Starrett garage.

"Of course, we all know that oil is a better lubricant than grease, but you and I know that there are many automobile parts—such as steering knuckles, spring supports, etc.—that must be lubricated with grease. Now grease has a tendency to harden, particularly when applied through openings in bolts. This hardening renders the grease cups useless and the only thing that can be done is to disassemble and remove these hardened deposits.

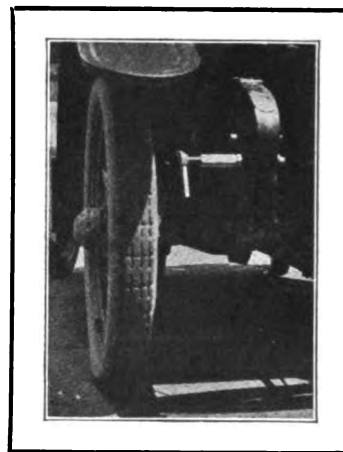
"Look at this," picking up a spring bolt which was lying on a nearby workbench and pointing to several deep grooves which were worn along its surface. "That's a sample of what neglect of proper lubrication can do to a car. When a car is driven with clogged bearings, the friction will cut out the bushings as well as the bolts and other internal parts.

"Now here's the tool that makes it easy for me to give the lubrication service that my customers need. Have you seen the Strickler high pressure grease and oil gun before? No? Well, I'll show you how it works.

"It's a little wonder, all right, for it means flexible steering knuckles and spring support, takes the strain off the steering, prevents sticking of the brake mechanism and guarantees free movement of all parts on which it is used, besides taking the squeak and jolt out of the springs.

"This grease gun exerts a pressure of from 15,000 to 18,000 pounds at the nozzle and forces rust, corrosion and old hard grease out of a clogged bearing, leaving it filled with fresh grease.

"When you want to use it, just remove the plunger, pack the gun barrel full of grease and replace the plunger, unscrew the



Strickler Grease Gun Cleans and Lubricates.

grease cup and screw the grease gun in its place. Apply moderate pressure to the plunger, then move the bearing. Work carefully and remember that this gun can attain a pressure of at least 20 tons in the chamber.

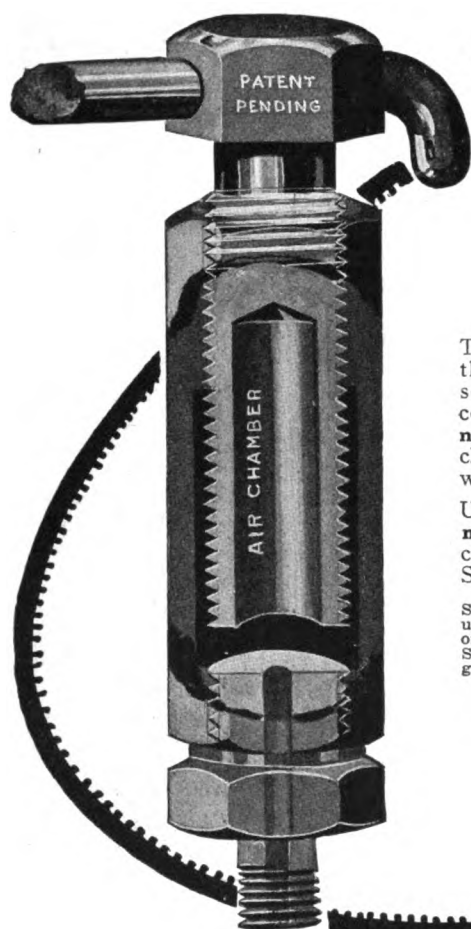
"Of course, the gun is primarily a grease gun, but it is equally efficient for applying oil and for washing out gritty or gummed bearings with gasoline or kerosene.

"I've used the Strickler grease gun for six years and have not yet found a bearing that it would not clean and thoroughly lubricate, so you can see that I find it a valuable piece of equipment."

The Strickler high pressure grease and oil gun consists of a hexagon steel barrel, chambered internally and threaded to receive nozzles which are threaded on their outer end to screw into grease cup openings. These nozzles are interchangeable and are made in standard sizes.

The gun may be purchased separately or may be had with the garage extra nozzle outfit, which consists of 18 pieces, including one 1/8-inch I. P. nozzle and one elbow, in a neat case. The complete set includes the gun and is offered at an attractive price.

Full details may be obtained from Adkins, Young & Allen Co., 561 Washington Blvd., Chicago.



It's a Winner

THE STRICKLER HIGH PRESSURE GREASE AND OIL GUN

**MAKES GOOD
BECAUSE IT'S MADE RIGHT**

The Strickler wins where others fail for the reason that it can't burst through back pressure. Look at the illustration of the Strickler and see why. This High Pressure grease and oil gun is made of solid, cold rolled steel, machined out and threaded from the bar stock. It's not cast. The pitch of threads gives positive, steady feed, and air chamber acts as cushion to steadily compress the grease and force it, without strain, where it belongs.

Under pressure of the Strickler, dust, dirt, corrosion and hard grease must go. Used everywhere as an auxiliary to lubricating systems costing great deal more. Price of gun \$3.50. Extra nozzles 80 cents. Specify name, date and model of car.

Series of special male and female nozzles make it possible to use Strickler High Pressure guns on any car. Manufacturers of Franklin, Pierce Arrow, and many others use and recommend Strickler High Pressure grease and oil guns. Special sets for garages, for use wherever grease cups are used, \$18.00 with gun.

Get complete particulars at once.

ADKINS, YOUNG & ALLEN CO.
561 Washington Blvd.
Chicago, Ill.



Wetprufe

Reg. U. S. Pat. Off.

Real Leather FAN BELTS

Our Group Fan Belts are especially popular this year. They enable you to fill all ordinary requirements from a very compact stock.

Sold by leading dealers everywhere.

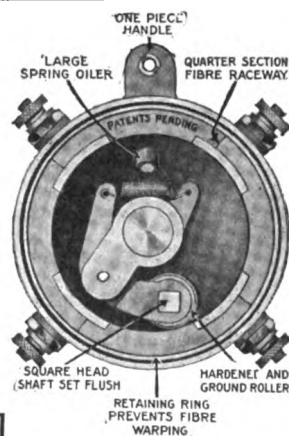


Ask your jobber's salesman for full information.

HIDE, LEATHER & BELTING CO.

Established 1870

Indianapolis



M&R TIMER

are OH KAY sellers because they are guaranteed. Note the substantial construction and it will be easy to understand why we have the largest individual factory specializing in timer manufacture.

On a solid ring fibre you get two of the wearing surfaces with the grain and two against the grain; this is one of the principal causes of a "humpy timer."

M&R—In every sense
A Better Timer to Time 'er Better
for all types of Fords and Tractors.
MCCULLOCH MFG. CO.
210 High St., BOSTON, MASS.

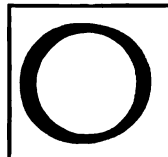
If for any reason an M & R Timer is not satisfactory, we will replace it without charge



The Raceway is of patented construction, made in four sections and cut against the grain. Expansion and contraction without warping is a feature.



The Oiler is spring-top type, self-closing and of sensible size.



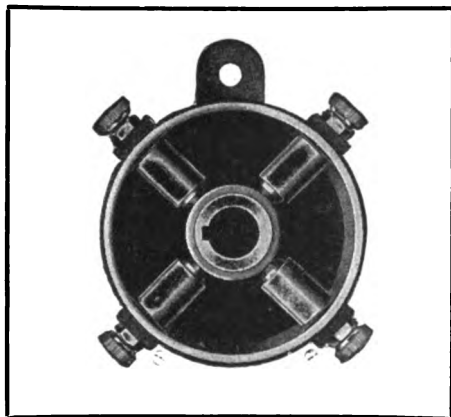
The Retaining Ring binds the four-piece raceway and keeps it absolutely rigid so that the posts cannot touch shell and short-circuit.



The Handle is made in one piece and securely attached to shell.

"Timer Troubles Vanish," Says Dealer, "When Daleco Is Installed."

Two Ford cars stood at the curb in front of the dealer's shop. They looked very much alike, those two cars—both were com-



Daleco Gives Guaranteed Timer Service.

paratively new, both gave evidence of careful handling.

Inside the shop, the two men who owned the cars stood at the counter waiting to be served.

Said Fordowner No. 1 to the dealer: "Say, I wish you'd recommend a timer for my car. I've had half a dozen repairmen tinkering with it and still the old bus refuses to start as it ought and causes me no end of trouble."

"Do you know," replied the dealer, smiling as he glanced at Fordowner No. 2, who, standing near, had been listening to the conversation, "I'm going to let our friend over here answer that question for me. He came to me not long ago with a tale of woe very similar to your own and, from the contented expression he is wearing, I have a 'hunch' that he isn't here this morning to tell me that my remedy failed."

"You said it," agreed Fordowner No. 2. "Jim, you're a canny Scot, all right. As usual, you hit the nail on the head. That Daleco timer has made my timer troubles vanish into thin air."

"You see," explained the dealer to Fordowner No. 1, "when you buy a Daleco timer you buy guaranteed timer service. The pure copper contacts and an electrical circuit composed entirely of brass and copper are designed to insure an intense, white hot spark which causes instant ignition and complete combustion of the gas—the result, maximum power and economy."

"A positive wipe contact breaks the oil film, resulting from lubrication, on the first turn and so assures easy, quick starting regardless of the weather or the oil in the timer."

"The Daleco has a true circular rotor, free from humps, bumps or depressions—thus you have regular, constant ignition and perfect timing of all cylinders."

"Short circuits or current leaks are eliminated by the use of a Bakelite or Condensite case—a material used in the highest class electrical apparatus—and which is a

positive non-conductor of electricity and impervious to oil and water.

"A Daleco requires no oiling—all you need do is install it in your motor and then let it alone."

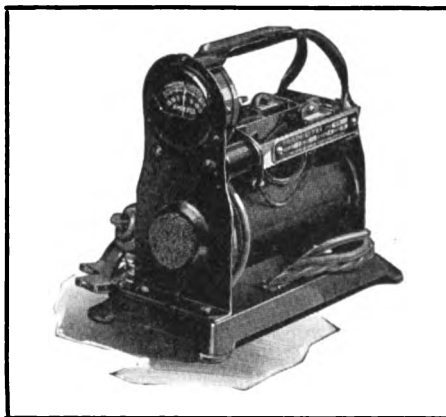
And so another Ford was given the chance to show that it could give its owner dependable service.

The Daleco timer is manufactured by the Dale Mfg. Co., of Chicago. Ask its sales department, The Zinke Co., 1329 Michigan Ave., Chicago, to send you descriptive literature and prices.

Severe Tests Emphasize Practical Value of Portable Rectifier.

After years of research by its engineers and two years of continuous practical tests in actual service—the severe tests to which all Sterling products must measure up—a portable rectifier has been placed upon the market by the Sterling Mfg. Co., of Cleveland, Ohio, which is sure to be received with enthusiasm by owners of automobiles, motor boats and radio equipment.

How often, Mr. Dealer, has a customer complained to you of the trouble, expense and loss of time involved because of the failure of his car to start at some critical



Sterling No. 900 Rectifier is Portable.

time? Often, no doubt. That car owner will be quick to appreciate the advantages of the Sterling No. 900 portable rectifier, with which he can easily recharge a battery in his own garage.

Keeping a battery properly charged retards decomposition of the plates and prolongs its life. A well-charged battery insures certain starting at all times.

It is only necessary to screw the plug on the end of the twisted cord into a lamp socket and attach the spring clips on the ends of the rubber-covered wire to the two terminal posts of the battery. There is no chance of making a mistake in connecting up. Either clip may be connected to either terminal, and it is not necessary to remove the battery from the car.

Although the Sterling portable rectifier charges at the normal rate when the battery is empty, the rate of charge decreases automatically as it becomes fully charged. This tapering down of the charge prevents injury to the battery plates through overcharge.

There is no danger of leakage or short-circuiting in case of an interruption of the current, as the contact is instantly broken when the current from the lamp socket fails. However, the rectifier begins to charge again the moment that the current returns. There is no possibility of overcharging or injuring the battery.

The Sterling portable rectifier is made in two capacities—6-volt and 12-volt—and with two styles of connection. In garages where more than one car is kept, the terminal clips are the most convenient equipment for connection direct to the batteries. As the Sterling rectifier is equipped with a handle and weighs only seven pounds, it is easy to place anywhere convenient to the car.

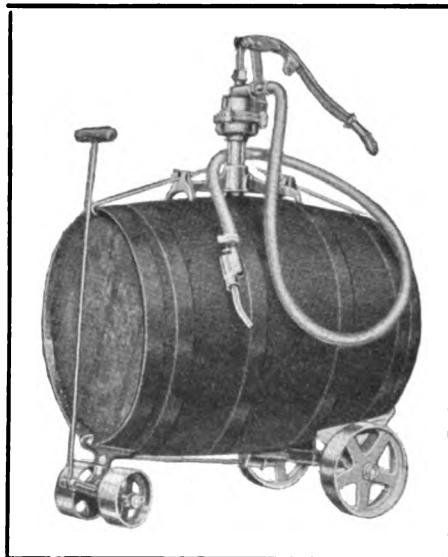
Where there is but one car, the dash arrangement is the better. Permanent wiring is run up to a plug-and-socket device attached to the dashboard. With this convenient arrangement, you need only to insert the charging plug into the dash socket and turn on the current in order to start charging. This takes only a second and does away with the inconvenience of removing floorboards and connecting charging leads to the battery.

Write the Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, Ohio, for descriptive literature and prices.

"Handy Ben" Will Help You to Give Quick Service.

Always on the job, fast and accurate—that's what they say about "Handy Ben." Handling grease and oil need no longer be a slow, dirty, wasteful task if you have "Handy Ben" to help you.

"Handy Ben" oil injectors are made to fit the heads of all steel or wooden barrels,



One Model of "Handy Ben" Injectors.

either half or full size, and are specially constructed to handle all oils or liquids. There are no leathers to rot, swell or wear and nothing to break or get out of order. The drip pan catches the drop and over-

They Come to Me



I'm off the main highway, but I sell the goods because I have

National Guaranteed Coupon Books

My customers like the convenience of paying for petroleum products with coupons. They like the quick and accurate service. They like the saving where a discount is made for cash.

I profit because I have no bookkeeping to do. No more disputes with customers. And I get my money in advance.

YOU can sell NATIONAL GUARANTEED COUPON BOOKS for cash—or use them for charge business. Your sales will soar.

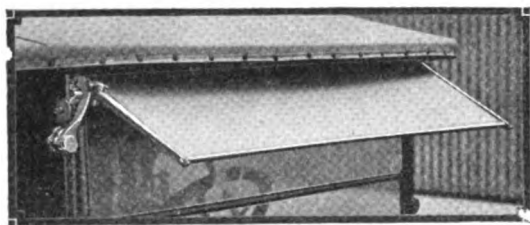
Start a coupon book campaign and they'll travel off the beaten path to buy from YOU.

There are some samples and quotations waiting for you at

National Checking Company
271 Chestnut Street
ST. PAUL MINN.



Jaknife WINDSHIELD VISOR



**WITH THE UNIVERSAL CLAMP
THAT FITS ALL WINDSHIELD POSTS**

These are the days that demand extra precautions for safe driving. Rain and sleet—obstructed windshields—glaring headlights—dazzling rays of the Sun—these are some of the dangers against which every careful motorist must guard. Prepare against them now by ordering the JAKNIFE visor, and you have an all-seasonal driving safety.

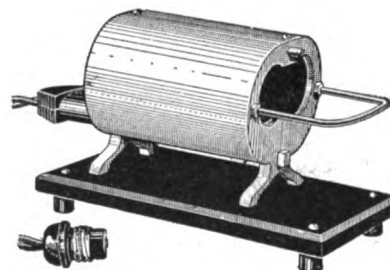
2 Sizes fits 100% of all cars of standard make.

Made of best quality material and workmanship.

Ask your jobber for demonstration and prices.

Roberts Mfg. Co., New Haven, Conn.

QUALITY and SERVICE OUR WATCHWORDS



MODEL B—\$15.00

It's a Hot Proposition— the Frisz Electric Furnace

Heat for Old Fashion Soldering Irons

An electric furnace for any size soldering iron. Heats hottern-heck in a jiffy. Stays hot at cost of less than 5 cents per hour. No fire danger. Easily portable. Fits any electric socket. One or two irons can be used at same time.

Write today to

FRISZ MFG. CO., Inc.

Indianapolis

U. S. A.

flow from overfilled measures and returns it to the original container.

The double valve and lever action with which a "Handy Ben" is equipped permits unusually rapid operation, and a special measuring gage makes stop setting unnecessary for measuring either half pints, pints or quarts. The cylinder automatically fills as it empties and the pump is always full and ready for service.

There are two styles of truck to be had with "Handy Ben" injectors, either of which provides a means with which the entire outfit may easily be wheeled from place to place, making the "Handy Ben" exceptionally useful in garages and service stations.

There are several models, descriptions of which together with prices may be had upon request from the Bennett Injector Co., Muskegon, Mich.

American Sign Co. Now Concentrating on Standard Garage Sign.

"If owners of garages not possessing an electric sign could spend a few hours in our plant and see how this sign is made, they'd enter their order for a garage special sign—or a special job—in double-quick time," remarked C. M. Davis, of the American Sign Co., Kalamazoo, Mich.

The American Sign Co. is just now making a special drive on a standard garage sign, in both horizontal and vertical styles. The American Sign Co. is located on Wil-

lard St., a couple or three blocks west of the Union station. It occupies a thoroughly modern factory building, especially adapted to its requirements, which allows space for expansion so that the company may retain the position which it claims as being the "world's largest specialty electric sign factory."

Because of the fact that a great many sign jobs are special in character, a well-equipped art department is an essential. It is interesting to note that this department directly adjoins the executive offices and that C. M. Davis, the general manager, and other executives of the company, are frequently at the elbow of one artist or another, looking after the interests of their patrons. In the art department, each and every job is visualized in colors before being manufactured.

Large stocks of metal and lumber are carried in the general stockrooms. Splendidly lighted departments are given over to the layout and punching department and assembling room, and large enameling ovens are provided for baking on the finish; ovens with capacity for the bigger jobs manufactured. Men who are artists in laying on paint are busily engaged in the finishing room.

Although the American Sign Co. has to its credit many of the biggest and most spectacular illuminated and flashing sign jobs in the world, there is a tendency to build staple, "bread and butter" illuminated signs with all the skill and with the

best materials and workmanship at its command.

The garage special sign, on which the American Sign Co. is concentrating special effort, is made as carefully and sturdily—for its purpose—as a sign running into several thousands of dollars. Typical "American construction" is used in assembling. Instead of bolting or riveting the faces to the framework, a special process of double-folding the sheet-steel faces to an angle-steel frame, and then electrically welding the faces to the frame, makes them absolutely taut, prevents buckling, and renders them weatherproof. These signs comply in every respect with the requirements of the National Board of Fire Underwriters. The finish is water-resisting, so that the signs keep their bright appearance for a long time.


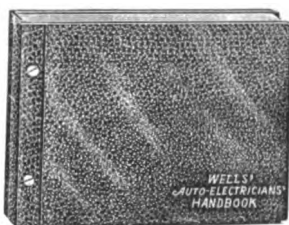
The American Sign Co. assures every purchaser that each job will be in strict accordance with representations and highly satisfactory in service.

COSTS \$25.00 PROFIT \$27.50

That's what you make by transferring decalcomania monograms on autos. Every motorist wants his car monogrammed. An artist charges \$5.00 and can't do as good work as you can do for \$1.50. No skill is required; no experience. Spare or all time. Circulars, full instructions, etc., free. Write for Free samples—or send \$2.50 for outfit by return mail.

AMERICAN MONOGRAM CO.,
Dept. 183, East Orange, N. J.

SAMPLE FREE

Does Your Auto-Electric Service Sell Results, or Only Your Hours of Work?

It's a simple case of add and subtract—

One Hour's Time (plus Wells' Auto-Electricians' Handbook)\$4.50
One Hour's Time (plus Lots of Hard Work and Worry) 1.50

Are you losing, or do you want to make the difference of\$3.00

There are forty reasons why Wells' Handbook is the biggest money maker in the electric service shop—here are three of them:

- First— **PERFORMANCE, ADJUSTMENTS, TEST METHODS, CONSTRUCTION.** From 1911 to now, on 1324 models of 270 different makes of cars, for their GENERATORS, MOTORS, REGULATORS, CUT-OUTS.
- Second—Real working diagrams, in blue print, of the internal wiring of each unit—with every brush, coil and terminal shown in its actual position as in the machine.
- Third—Exact and specific instructions for each different make of machine—with real "brass-tack" information and no glittering generalities.

Do you want to know HOW and WHY Wells' Auto-Electricians' Handbook will make money for YOUR shop?

Then write today for sample pages and a complete description.

It's easy to buy—and easy to pay for, too.

AUTOMOTIVE PUBLISHING CO.
448 S. Dearborn St., Chicago, Ill.

The Sterling

POLARITY INDICATOR

A ONE
HAND
TESTER

SAVES
TIME
AND
TROUBLE

DIAMETER
2 1/4"



NO
CHANCE
FOR
WRONG
CONNECTIONS

THICKNESS
7/8"

STERLING
NO. 91
POLARITY
INDICATOR, PRICE
\$1.75 NET

THIS instrument is built for rapid and accurate polarity testing. Specially constructed so that the indicator hand points directly to the positive terminal every time, making it easy for a workman to test cells with one hand while placing them in proper position for connections with the other. An ideal instrument for service stations, battery manufacturers and electrical repair men.

Other Sterling Products: High Rate Cell Tester, Magneto Meter, Portable Rectifier, and other automotive electrical specialties.

Write for Bulletins.

2849 Prospect Ave. **THE STERLING MFG. CO. CLEVELAND, O.**
The Largest Producers of Dash Ammeters in the World.

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

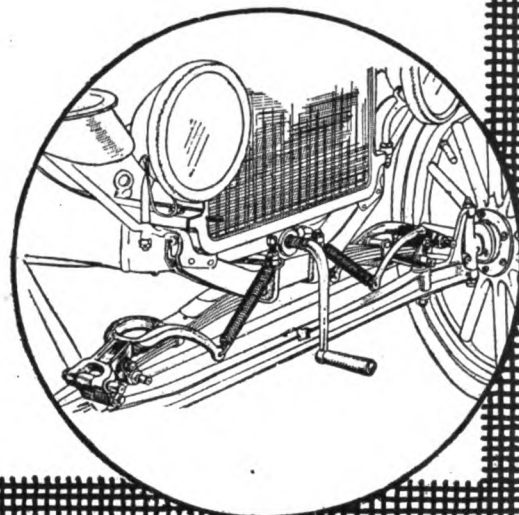


Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



"NOKORODE Soldering Salts is a friend of mine"

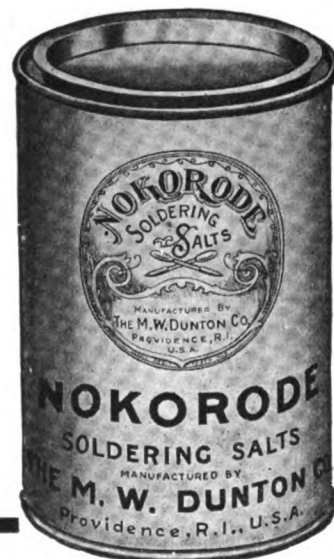
says the veteran mechanic. There is certainly great significance in the fact that thousands of repairmen, who have tried about every soldering preparation, now use nothing but NOKORODE.

There are several reasons why. When NOKORODE is used the job has to be done only once—it makes a secure, permanent bond. NOKORODE SALTS contains no acid and is absolutely non-corrosive and harmless to metals—also the worker. Cut with eight parts of water it will solder all metals and will not burn the mechanic's hands or clothing.

NOKORODE is used by the leading motor car and truck manufacturers.

To introduce NOKORODE in your shop we will send you a can on a money back guarantee. Send in the coupon today.

THE M. W. DUNTON CO.
Providence, R. I., U. S. A.



Place a trial order today

THE M. W. DUNTON CO.,
670 Eddy St.,
Providence, R. I.

Gentlemen:—

Enclosed find \$1.00 for which please send me a one-pound can of Nokorode Soldering Salts. It is understood that these Soldering Salts will satisfy me in every way, or you will refund my dollar.

Name

Address



Refacing—right!

On account of a special guide bearing that lines up the cut with the STEM, you can cut a true seating surface on a warped valve head with the filing refacer furnished with the

SKINNER Motor Valve Set

which also includes a reseater taking all 45° jobs, 1½ to 3½, and four accurate pilots. Send for new treatise on valve-work giving all the data on this difficult subject—we're glad to mail them anywhere—free.

M. B. Skinner Co.

560 Washington Boul. CHICAGO

INSTANSEAT seat Instantly PISTON RINGS

Dealers say—"It pays to handle INSTANSEAT rings because:

- Customers desire quick results—
- Preventing passage of excess oil
- guarantees against come-back jobs—
- Individual virgin grey iron castings
- insure good results after long usage—
- and because

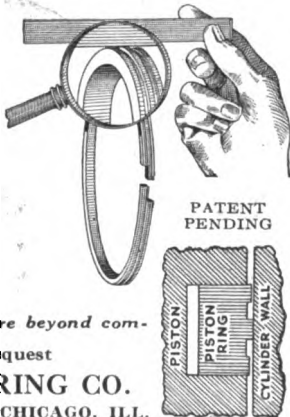
Quality, prices, and discounts are beyond comparison.

Sample ring mailed on request

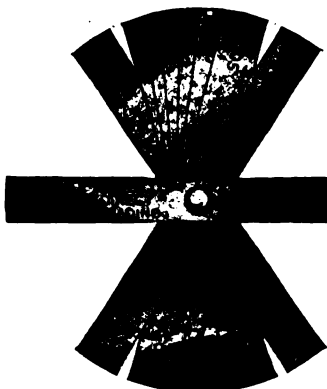
KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL.



You Don't Guess the Answer You READ It on the Blade



Cylinder measurements guaranteed accurate to within .00025" and less.

The AM-PE-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and instantly read the correct measurement.

Get the whole story in our circular.
PRICE \$2.50

AM-PE-CO SALES CO.
Marshalltown, Iowa

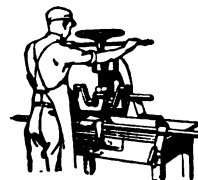
CONTINENTAL

The Efficiency Standard

SHOP EQUIPMENT

The Continental Line

Motor Stand
Ford Engine Stand
Assembly Table
Welding Table
Battery Stand
Radiator Stand
Axle Stand
Crepper
Spindle Arm
Bushing Press
Crank and Camshaft
Straightening Press
Piston Vise
Riveting Jig
Piston Aligning Device
Parts and Tool Tray
Wrecking Truck
Burning-In Machine
Gear Pullers
Universal Straightening Press
Ford Assembly Table
Portable Work Bench
Propeller Stands



Universal Straightening Press

Designed for all kinds of straightening work, from factory requirements to garage and service station work. The dial indicator shows you to one-thousandth of an inch. It's a member of the Continental equipment family.

Write for catalogue of complete line.

*The Best Garages use
Continental Equipment*

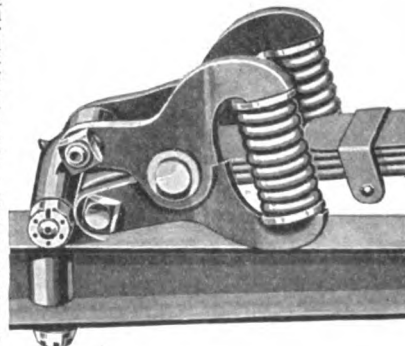


CONTINENTAL AUTO PARTS COMPANY



Star W-X Outshines All Other Ford Shock Absorbers

Give the greatest flexibility and comfort on either a normal or full load. Do not affect spring mounting of Ford Car. Simplest and easiest to install—car owner can do it himself. The biggest shock absorber ever offered at the price—\$8.00 per set of four. Three styles—No. 1 for Runabouts, No. 2 for Touring, No. 3 for Sedans. DEALERS—Here's a real money maker. Write today for full data.



STAR SPECIALTY MANUFACTURING CO.

227-233 W. Erie St.

CHICAGO, ILL.



*A line that
will pay
you to sell*

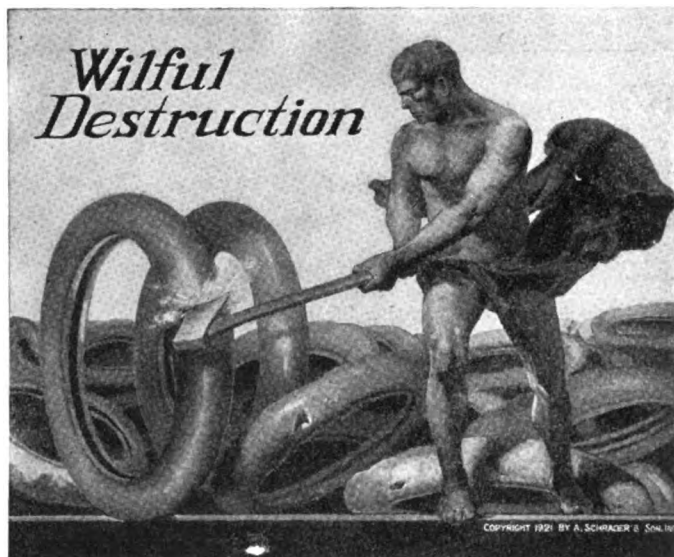
SUPERBESTOS Folded and Stitched BRAKE LINING

outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.



DEALERS and REPAIRMEN—
Write for data and prices on brake lining, clutch facings, Ford Transmission lining, running board mats and packings.

Manufactured by
MIKESELL BROTHERS COMPANY
156 No. La Salle St., Chicago, Illinois
Plant and Works, Wabash, Indiana



WE are running this picture with appropriate text in consumer publications of national circulation in order to impress upon millions of readers the **absolute necessity** of maintaining adequate and evenly balanced air pressure in their tires.

You can do your part in this campaign of education by telling your customers what **YOU** know about the costliness of under-inflation.

This will not only net you a profit on the sale of **SCHRADER UNIVERSAL TIRE PRESSURE GAUGES**, but will gain for you the good will of your customers.

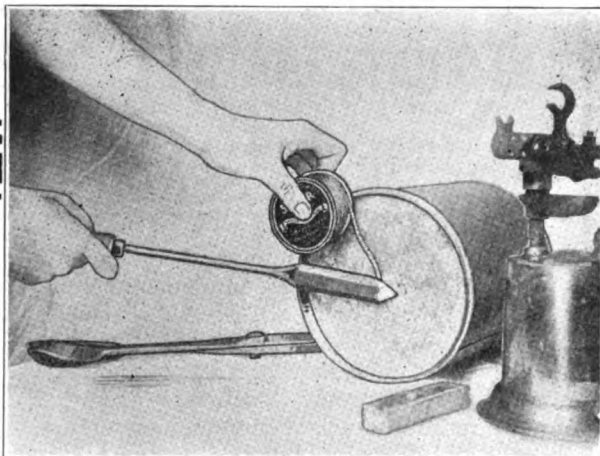
A. SCHRADER'S SON, Inc.

Brooklyn, N. Y.

Chicago

Toronto

London



"Combination solder and flux" is just a long way of saying



CHICAGO SOLDER CO.

4210 Wrightwood Ave.

CHICAGO, ILL.

See what G. H. Radebaugh says about "combination solder and flux" on page 26 of this issue of the **AMERICAN GARAGE AND AUTO DEALER**.

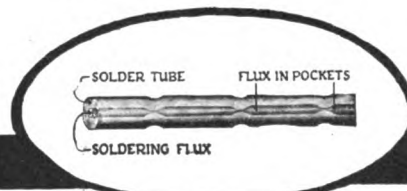
**"New and easier way of doing work.
Simplifies soldering jobs.**

**Especially adaptable to radiator
repair soldering, etc.**

**Solder in wire form not easily
wasted as when in large stick.**

Both hands of operator free.

**No delay to apply flux during
soldering operation."**



FREE SAMPLE COUPON

CHICAGO SOLDER CO.,
4210 Wrightwood Ave., Chicago.

Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder.

Name

Company

Address

City State

Our Supply House is

Am. Garage 4-24

Give the **AMERICAN GARAGE AND AUTO DEALER** Credit When Writing Advertisers.

Any Car is a Better Car with a Wickey Battery

We want Dealers—to stop Battery Grief

—to do away with expensive “free” service. To sell the battery that does not need the care and attention that other batteries must have. You are invited to sell the most remarkable storage battery ever built: the

WICKEY Semi-Dry Rechargeable Storage Battery

You can make your business more profitable by selling Wickey Batteries, not more profitable from the standpoint of the original sale—but more profitable because after the sale there is no free service necessary.

Responsible business men who are alive to the possibilities of increased battery sales, increased profits, and greater customer's satisfaction are invited to write for full information. We have some desirable territory open for the right men.



Wickey Features

*Semi-dry: no acid or liquid to leak or spill.
Has no wall separators to give out.
Plates cannot buckle.
Needs water only 3 or 4 times a year.
Will NOT freeze or overheat.
Guaranteed three years.
Rechargeable from generator without removal from car when fully discharged.*

Write us today for complete details of our proposition to you for handling the Wickey Battery sales in your territory.

There is a Wickey Battery for every car—guaranteed for three years of service



WICKEY BATTERY CO.
730 Exchange Avenue
EAST CHICAGO - IND

Buffum Buick Valve Remover

FOR THE GARAGE

A Garage Owner can not afford to use any but the most efficient tools in his work. He must so conduct his business as to obtain the most satisfactory results with the least possible expenditure of time, labor, and money. Buffum Buick Valve Removers save time and are easily handled. They also afford a protection to the customer against breaking of valve seats, springs, or washers—so often caused thru the clumsy handling of a crow-bar in removing the valves.

Because the Buffum Buick Valve Remover gives the best results and by its use adds a strong link to the chain of Buick Efficiency its results are favorably felt by the Garage Owner.

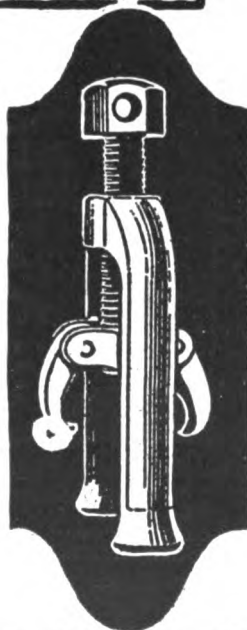
BUICK VALVES

should be cleaned at least every 5,000 miles, thus making the Buffum Buick Valve Remover a necessity to the Buick Owner. Should he have trouble on the road and find difficulty in locating it he will appreciate the handiness of a Buffum Buick Valve Remover.

A satisfied customer always comes back and the sale of a Buffum Buick Valve Remover adds another satisfied customer to your books.

Retail Price \$2.00. Fully guaranteed.
Write for trade prices.

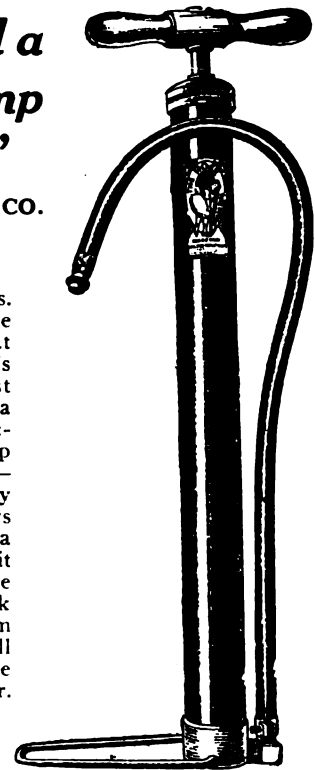
BUFFUM TOOL CO.
Factory and General Offices
4th and N. Carolina Sts.
Louisiana, Mo., U. S. A.



“When we sell a Rose Tire Pump it stays sold.”

—THOMPSON AUTO CO.
BARRON, WIS.

No kicks! No complaints. No customers lost because you sold them a pump that wouldn't pump. That's why the Rose is the most popular pump in America today. It gives satisfaction. It is built to pump air quickly and easily—and makes good every time. Sell your customers on the idea of owning a good pump. You'll find it a lot easier to sell a Rose than cheap makes. Ask them to buy. Show them a real pump and you will get many an extra tinkle out of your cash register.



Frank Rose Mfg. Co.
HASTINGS, NEB.

LET'S HAVE THAT NEXT ORDER!

**When you need a Doctor
Do you get estimates?**

NO! you engage a Physician in whom you have confidence. That's why you use F.A.A. ALUMINUM and CAST IRON MENDS. You have confidence in them in making permanent repairs, such as scored cylinders, cracked water jackets and aluminum castings.

**F. A. A. Aluminum and Cast Iron
Mends go straight to the job.**

**Distributors—Dealers—Agents
WANTED**

F. A. ALBERTUS & CO.
206 Ninth Street, Milwaukee, Wis.

Western Distributor
CARL M. ANDERSON, Vineburg, California

Announcing Two New Boe Grease Pump Buckets



Galvanized Iron, 30 lb. Capacity

Pump grease in or out of gear case, wash gear case out with kerosene, or dispense another consistency of gear lubricant with same pump if you like.

THREE WAY VALVELESS, with pump attached to bucket cover as shown, \$10 each. TWO WAY SPECIAL, same valveless pump without quick detachable pump feature, \$5.75 each.

We also make a new Barrel Pump, same valveless construction for only \$10.

BOE MANUFACTURING COMPANY
Minneapolis, Minnesota

STORM CYLINDER REBORING MACHINES



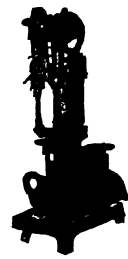
World's Standard for Speed Accuracy and Reliability

Made in All Sizes from Small Hand Tools to Large Vertical Boring, Boring and Milling Machines.

Capacities to Meet Your Requirements.

Write Today for Complete Catalog Covering Storm Equipment

STORM MFG. COMPANY
Dept. E. Minneapolis, Minn.



O'BRIEN HEAVY DUTY GREASE PUMP

makes the handling of grease
SWIFT — CLEAN — EASY — SURE

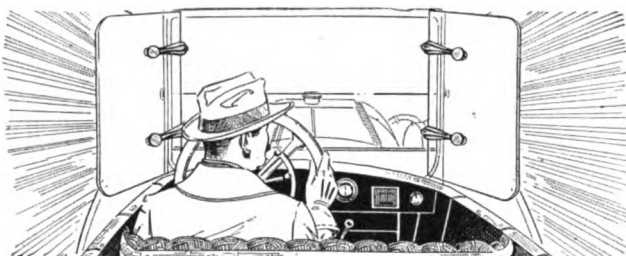
One man greases any differential or transmission in two or three minutes.

No grease is spilled on car, floor, hands or clothes. Delivers 1/2 pound per stroke. Indicator shows amount used.

Sold on money back guarantee.

McCulloch

1406 S. Michigan Ave. Chicago



STAR GLASS WINDSHIELD WINGS

Clear, Amber and Green Glass—No Holes in Glass

Successfully on the market over two years.

Write for particulars

STAR WING CO., 170 W. Randolph St., CHICAGO

KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by

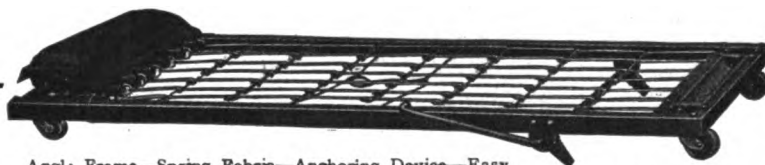
THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.
Canadian Branch Factory at Woodstock, Ont.

"I am very much pleased with the AMERICAN GARAGE and AUTO DEALER. I got one idea from you that will just double my sales in 1922."

WM. J. BRAUN,
Braun Vulcanizing Co.
Wahpeton, N. Dakota.

Foster

Auto Repair Creeper
METAL CONSTRUCTION



Angl. Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

FOSTER BROS. MFG. CO., UTICA, N. Y., U.S.A.

\$5.00

Ask for the name of the Foster Distributor in your territory.

DIRECT REPRESENTATIVES

Eastern and Southern States: Asch & Co., 16-24 W. 61st St., New York, N. Y. For the Mid-West: Jessop & Thompson, 1421 S. Michigan Ave., Chicago, Ill. Pacific Coast & Inter-mountain Territory: McDonald & Linforth, 739 Call Bldg., San Francisco, Cal.

You Need One or Both These Gear and Wheel Pullers

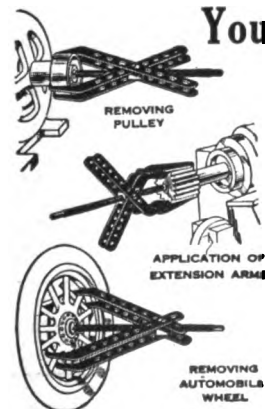
The "LITTLE GIANT"

pulls any gear, wheel or pulley—anywhere—in a jiffy. Built on the only correct principle—produces maximum efficiency with minimum effort. Can't twist off or let go. Made of best grade drop forge steel. Adjustable up to 13" diameter. Price complete with extension arms \$12. Satisfaction guaranteed or money refunded. Order one today or write for data.

"THE HARDER THE PULL—THE TIGHTER THE GRIP"

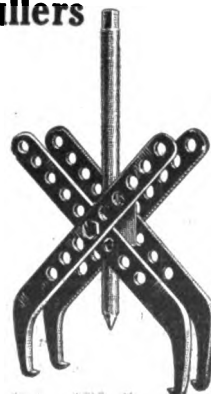
Write for dealers' discounts and literature

Premier Electric Co., 3802 Ravenswood Ave., Chicago



"BIG BUSTER"

This heavy duty puller is designed to cover a range of work upward from where the "LITTLE GIANT" and other tools leave off. Weighs 100 lbs.—open adjustment 40". Pulls heavy motor truck and car wheels, ship and aeroplane propellers, heavy fly and gear wheels, transmissions, etc., easily. Can't slip off work—no arm locks required. Price complete with wrench and handle, \$50. Where you have a job no other puller will touch you need a "Big Buster."



The Garage *and* Shop Market Place

B-N (PISTON PINS—Practically Perfect—

Hardened by Special Process—Machined from Solid Steel

24-Hour Service From These Jobbers

Atlanta, Ga.
Pasco Tool Co.
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Litters Motor Machine Shop
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Midwest Auto Supply Co.
Ft. Wayne, Ind.
Ft. Wayne Iron Store Co.
Indianapolis, Ind.
Homer A. Keller Co.
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Auto Parts Co.
Joplin, Mo.
Joplin Supply Co.
Los Angeles, Cal.
Weinstock-Nichols Co.
Louisville, Ky.
Peaslee-Gaulbert Co., Inc.

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Marion, Ohio
Lawrence Auto Supply Co.
Milwaukee, Wis.
Shadbolt & Boyd Iron Co.
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Loeb Hardware Co.
Newark, N. J.
Economy Auto Supply Co.
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New Orleans, La.
Oliver H. Van Horn Co., Inc.
Oklahoma City, Okla.
Sharp Auto Supply Co.
Oakland, Cal.
Weinstock-Nichols Co.
Omaha, Neb.
Sunderland Machinery & Supply Co.
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Richmond, Va.
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W.A.L. Thompson Hdwe. Co.
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BURGESS-NORTON MFG. CO., 509 Peyton Street GENEVA, ILL.

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Sales Branches Only
A. H. Deveney & Co. Ed. White Company
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CYLINDER REGRINDING

Standard and Oversize

PISTONS
PISTON RINGS **PISTON PINS**
ALL WORK INSPECTED

With our **BU-NITE PISTONS**
Goes a **GUARANTEE**
of **SATISFACTION**

Standardized Prices
Material and Workmanship Guaranteed
Modern Equipment
Skilled Mechanics

Butler Manufacturing Co.
Established 1897 INDIANAPOLIS, IND.

THE HOPLAND GARAGE

HOPLAND, CALIFORNIA

W. A. MORRISON, Proprietor

Auto Supplies, Tires, Tubes

Gasoline, Oil and Free Air

BATTERY SERVICE STANDARD PRICES

Reboring, Acetylene Welding, etc.
Vulcanizing, Lay Works

PHONE 172



JOBBER — DEALERS!

Are you prepared to supply the demand for Trindl Piston Pins?

Trindl Piston Pins are the best pins you can buy. They are special heat treated which gives them a hard surface of about 1/32" in depth—accurately ground and tested to 1/10 of 1/1000th of an inch.

We carry an enormous stock of piston pins for all makes of motors, standard and oversize for immediate shipment. Specials on 24-hour notice. Quality, price and service makes us your most logical source of supply.

Send for Our Piston Pin Specifications and Price List.

The TRINDL CO. CHICAGO 2917 SO. WABASH AVE.

ANDRE G. CATELAIN

General Automobile Machine Work, Welding of All Metal—Authorized Ever Ready Battery Service Station—Sheet Metal Work—Manufacturer Catelain Hose Coupling—Sales and Service U. S. E. Shock Eliminators, 1446-8 Indiana Ave., Chicago, Ill.

SIMPLEX STARTER \$20

Attach it yourself on Ford Auto. Guaranteed. Agents Wanted. American Simplex Co. Anderson, Ind.

Make your own Aluminum Solder

that will stand the test, and repair Aluminum crank cases, auto hoods, fenders, transmission cases, auto bodies, patterns, in fact anything that is made out of Aluminum.

Send 50c for sample and literature (No personal checks)

FORMULA \$5.00

J. N. BRACKMAN
727 So. Oakley Blvd. Chicago, Ill.

FOR SALE:

Liquid Cooling Apparatus

Especially designed for automotive engines; a demonstrated success; apparatus does not require a fan for cooling the water. Eliminates trouble and annoyance of clogged cooling system; obviates danger of frozen radiator and tubes. Creates new method for displacing and cooling water. Dispenses with pump. Makes a neat appearance; can be used with any make or design of automotive engine.

Further particulars on request

Box No. 5, care of American Garage & Auto Dealer

Guaranteed Repairs and Replacements—Any Make or Type Magneto--Generator--Starter DISTRIBUTORS—JOBBER

Briggs and Stratton Co.—Basco Cutouts—Switches—Panels. Connecticut Ignition—Atwater-Kent Ignition—
Lighting—Starting. Link-Belt Silent Chains. National Carbon Company—Pyramid Brushes. Eclipse
Machine Company—Bendix Drives and Parts. Ray Storage Batteries—Guaranteed Unconditionally Two Years.
Official Service Station: Bosch Magnetos—Starting and Lighting Systems.
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Authorized Dealer Delco-Remy Starting—Lighting—Ignition

SERVICE BY THE GOLDEN RULE

SAMPSON ELECTRIC COMPANY — STARTING - LIGHTING - IGNITION — 2334 - 36 SO. WABASH AVENUE, CHICAGO

"PRO-TEX-OIL" THE MIRACLE LUBRICANT

FOR FORD CARS and FORD TRUCKS

"PRO-TEX-OIL" is a high grade, natural, rich automobile oil, refined from Pennsylvania Crude, manufactured and compounded in such a way as to permit it to retain a larger percentage of lubricating fat than through the ordinary refining process. Through the process in which we manufacture this oil, it retains its natural lubricating fat which greatly improves the lubricating qualities and accomplishes its most important object which is THE ABSOLUTE ELIMINATION OF CHATTERING in Ford cars and Ford trucks.

It is a known fact that by not stopping this chattering when you have the means of doing so (using our "PRO-TEX-OIL") you are absolutely shaking your Ford car into the repair shop and this means a big additional expense.

By eliminating the chattering you eliminate the loose bolts and nuts in all parts of the Ford car or truck. Practically all transmission troubles and rear axle troubles are caused by this unnecessary chattering.

"PRO-TEX-OIL" eliminates the changing of brake-bands to stop the chattering. The result is that PRO-TEX-OIL will give more mileage on oil and gasoline, more power, no excess carbon, and the absolute elimination of the

annoying succession of jerks and jars you get every time you brake down your car or reverse it.

A Ford car or truck is usually selected from the standpoint of economy and it really lives up to its reputation in this respect. Automobile Oil is practically the most important part of your car, therefore, our "PRO-TEX-OIL" is the most important and should have first consideration.

"PRO-TEX-OIL" IS THE GREATEST SHOCK ABSORBER OF THEM ALL—absolutely no annoyance from bumps and shocks when applying the brakes if you use our "PRO-TEX-OIL" for your Ford cars or trucks.

OUR GUARANTEE

"PRO-TEX-OIL" is guaranteed to immediately stop the chattering in the brake-bands, to increase the power and leave no excess carbon residue. By that we mean the carbon residue from PRO-TEX-OIL is less than that from other oils as "PRO-TEX-OIL" is refined from Pennsylvania Crude.

"PRO-TEX-OIL" is the greatest achievement in Ford automobile lubrication.

Dealers and Jobbers Wanted: Territory going fast; write or telegraph for territory.

THE REPUBLIC PRODUCTS COMPANY

PROSPECT BUILDING
CLEVELAND, OHIO, U. S. A.

J. NEWTON BODDY

*Auditor, Accountant, Systematizer
Specialist in Automotive Accounting*

Audits, Investigations, Surveys, Systems
Income Tax Reports

Monthly Balance Sheets and
Operating Statements Prepared.

Unit and Process Costs Established.

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Phone Atlantic 1810

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Cash Journals, Sales Journals, Ledger Leaves,
Purchase Journals, Car Records, Truck Records,
Storage Tags, Shop Cards, Duplicate Statements,
Special Forms, Purchase Orders, Invoices,
Sales Books, Blank Books, Loose Leaf Binders.

*We Specialize in Systems for Automotive
Dealers*

V-Plex Piston Rings

A Few Agencies Still Open

REPUTABLE mechanics know the value of side expanding rings. This statement is proven by our large business with repair dealers.

Over 90% of sales are repeat orders.

V-Plex rings embody many other special features of particu-

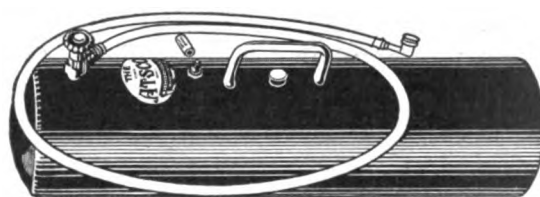
lar importance—may we explain them to you?

Exclusive county and section representatives for this remarkable, self-adjusting-to-wear-in all-directions ring are being appointed. Possibly the agency for your district has not yet been assigned. Find out. Write now.

KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL.



You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

Pittsburgh, Pa.

DOUBLE LATTICE TRUSS

Guaranteed to Carry Any Snow Load

For the new garage, or the old one that is being remodeled, this makes the strongest and sightliest construction. Adaptable to spans up to 125 feet—eliminates all posts. Constructed right on the ground where the building is going up. Write for complete information.

LEO McDANIEL CONTRACTING AND ENGINEERING CO.
218-220-222 NINTH ST. CAIRO, ILLINOIS

YAGER'S

Trade Mark Registered

SOLDERING SALTS

for soldering all metals—just dissolve in water and the flux is ready. Harmless, quick-acting — just the thing for automobile repairs.

Buy it from your jobber in $\frac{1}{2}$ lb., 1 lb., and 5 lb. cans.

New Prices for 1922.

ALEX. R. BENSON CO., Inc.
Hudson New York



Spark Plug Troubles
Are Rare Occurrences
on the car equipped with
UNIVERSAL

SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon.

These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is misfiring and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and greasing which cylinder is misfiring.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM
JOBBER and DEALERS—Your profit is liberal.
Write today for our attractive proposition

UNIVERSAL MFG. & SALES CO.
550 W. Harrison Street CHICAGO, ILL.

UNIVERSALLY SUPREME

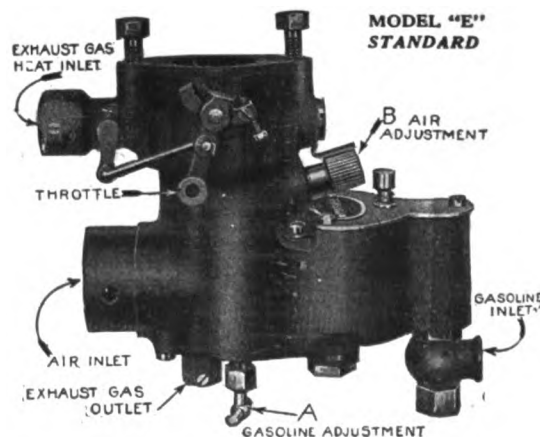
KENDELL

MOST PERFECTED PISTON RINGS

(PATENT PENDING)

THEY are the height of Engineering Achievement, possessing every advantage to be found in any other piston ring, plus the matchless features peculiar to themselves.

KENDELL ENGINEERING CORPORATION
FORT WAYNE, INDIANA, U. S. A.



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

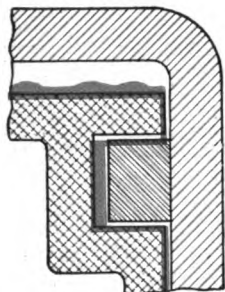
ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.
FLINT, MICHIGAN, U. S. A.

PISTON 3A RINGS



Conventional and other multiple piece rings leak oil around the groove.



SPECIAL BEARING METAL,
TRY THIS ON ANY OTHER RING

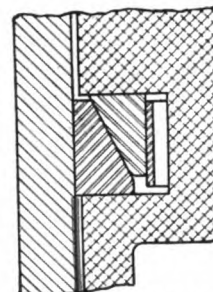
HOLD COMPRESSION

Keep Spark Plugs From Fouling

Keep Oil Out of Combustion Chamber

Take Care of Cylinders up to .008 Out of Round, Even on Aluminum Pistons.

The Spring Against the Ring Does the Work.



3A PISTON RINGS not only fill the groove, but have the same one-piece bearing surface as the conventional type ring.

SOME TERRITORY STILL OPEN

WRITE FOR CIRCULAR 25

STEEL SPRING PISTON RING CO.

147 Metropolitan Ave.

BROOKLYN, N. Y.



Mends punctures and blow-outs TO STAY MENDED.

This is the original, the genuine, no heat, no cement, no gasoline inner tube repair. Patents, fully covering process, pending.

Notice—Dealers who are interested in securing the most profitable and aggressive sales co-operation ever offered on an automobile product will please write direct to manufacturers.

ROBERT M. BOWES CO.,

INDIANAPOLIS

A Product That Brings Repeat Sales

AN exceptionally efficient carbon remover, containing no acids, alkalies or ether, and guaranteed not to injure the metal of the engine or interfere with lubrication.

MOTOR-KLEEN has proven a fast-selling article with an unusual repeat sale value.

Full information will interest you.

The Motor-Kleen Corporation
Long Island City New York

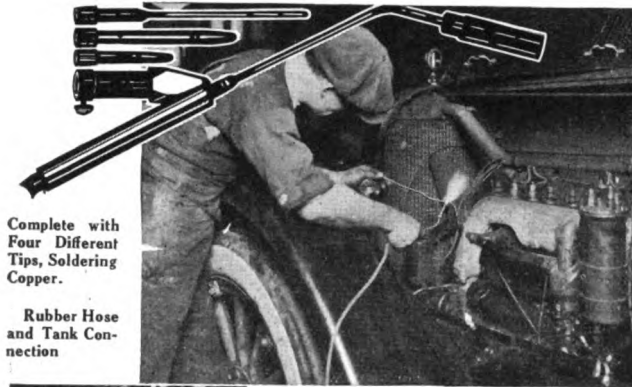
MOTOR-KLEEN
TRADE MARK
The Scientific Carbon Remover



Pint can (will clean 16 cylinders)\$1.00

Spray (assuring correct measure and complete distribution).... .30

MOTOR-KLEEN CORPORATION, New York
Enclosed find \$..... for which
please send me..... cans of Motor-Kleen
Name.....
Address.....
City..... State.....
A.G.A.D.-4

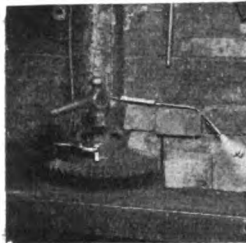


Complete with
Four Different
Tips, Soldering
Copper.

Rubber Hose
and Tank Con-
nection



Battery Work



Preheating Rivets

Torit Acetylene Torch No. 13 Provides Instant Hot Flame

For radiator and battery repairing, soldering electrical connections, fenders, pots, pans; or for preheating fenders, tempering tools, removing rusty nuts and bolts, light brazing and hundreds of other uses. Garages everywhere are increasing their earnings with Torit Torches.

USES ACETYLENE ONLY

You can use a discarded auto tank. A practical Outfit for Every Mechanic. Has Hundreds of Money Making Uses.

ORDER YOUR TORCH TODAY

Torch with 4 different tips and soldering copper, 5 ft. tubing and tank connection \$7.50

Order from your jobber—if he cannot supply you, send to us

ST. PAUL WELDING & MFG. CO.
165 W. 3rd Street St. Paul, Minn.

INCREASE YOUR PROFITS BY MEETING THE DEMAND FOR THE ONLY MONEY GUARANTEED BURST PROOF RE- PLACEMENT RADI- ATOR FOR FORDS.

**\$100.00
REWARD!**

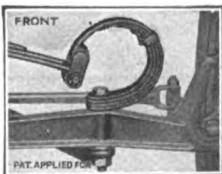
The JAFFE RADIATOR COMPANY will pay \$100.00 reward to anyone who can prove that the core of any JAFFE radiator can be damaged by freezing.

The Jaffe \$100.00 Reward Guarantee has a wonderful appeal for your customers. It is the greatest selling feature ever offered the trade. It means big JAFFE sales for you.

Write for the JAFFE Yellow Book and our new three-color display signs, imprinted with your own name and address.

Jaffe Radiator Co.
741-D W. Van Buren St.
CHICAGO, ILL.

Dealers Wanted! Exclusive Territory



—to handle Grey Goose Shock Absorbers. Easiest riding absorber of all time. Not only absorbs the shocks but checks rebound instantly. A demonstration sells almost every Ford owner. Easily and quickly attached. Only 4 bolts to change—requires no special tools. Sells for about half usual price for high grade absorbers—only \$10 for complete set of 4. (\$12 in Rocky Mountain States and West.) Liberal discount. Grey Goose Absorbers are also made for Ford Trucks and Dodge Cars. Exclusive territory being assigned rapidly. Write for Folders and Agency Terms.

Indiana Parts Co., Dept. 226 Richmond, Ind.

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**AUTOMOBILE
SPRINGS**
MANUFACTURERS AND SPRING SERVICE
GARDEN CITY SPRING WORKS
2300 Archer Ave. Chicago

Importance of Generator Cut-Out

A chain is no stronger than its weakest link:—

An electrical system is no more certain of effective function than its generator cut-out relay.

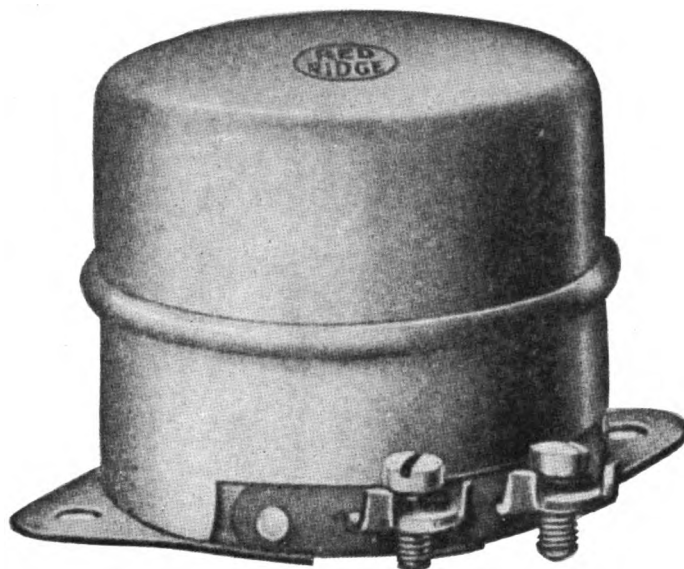
This fact is indisputable! Why not use the best possible relay?

Extensive research and endless experimenting by our competent engineers have developed the popular **RED RIDGE** generator cut-out relay that is used throughout the land by the most critical operators in the automotive industry.

**Half-way methods
can only produce
half - way results.**

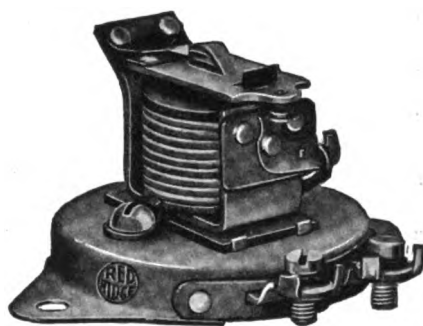
Why not use the best?

**THE
RED RIDGE**
Cut-Out Solves the Problem

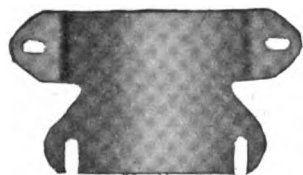


Guarantee and Tests

We safeguard each instrument from the inception of construction to completion by six rigid tests and it is consequently guaranteed to make good or we will.



Vital Advantages of the RED RIDGE Cut-Out



All of the wire used in its construction is first enameled, baked and then cotton covered.

The shunt (inside core) has a varnished cambric covering between each layer of wire.

Only pure silver oversized contacts are used.

The adjustable base plate makes the instrument adaptable for either generator or dash mounting. This convenience will appeal, where replacement is necessary on the Ford generator.

This combination of salient features makes the **RED RIDGE** cut-out the most desirable instrument for standard equipment and replacement purposes.

Sample and Literature Sent Upon Request

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| LIST PRICE COMPLETE WITH ADJUSTABLE BASE PLATE | } | on 6 VOLT TYPE | \$2.25 |
| | | on 12 " " | \$2.50 |

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135 Spring St. **NEW YORK CITY**

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Star Wing Co., 170 W. Randolph St., Chicago.
- WORK BENCHES (Portable)**
Continental Auto Parts Co., Columbus, Ind.



Day View of the
Horizontal Sign

The mail order price on this American "Garage Special" Sign is so extremely low that no concern doing a garage business can afford to be without the trade-winning power of so handsome a sign.

"Stop!--there's a garage!"

Hundreds of cars come in from outside and pass through your town daily that need garage service. Drivers look for a "Garage" Sign. You need an electric day-and-night sign to stop tourists and win bigger local patronage.

DON'T LET TRADE DRIVE RIGHT PAST

It is amazing how unobserving and short-sighted many drivers become. You may have a sign above the door—signs in the windows—even a filling station on the curb—but they easily miss you when they are looking for just **one big word**, "GARAGE".

Don't let trade drive right past. Stop more good transient business and interest a bigger local patronage with the clear, bright foot-high letters of the American "Garage Special" Electric Sign. You lose trade if you take it for granted that everyone knows you do a general garage business. Tell them! Tell them without taking a minute of your own time. Tell them at almost no expense. Tell them 24 hours a day. Tell them with an American "Garage Special" Electric Sign which will be shipped you at a price so low it will pay for itself faster than we ask you to pay for it.

As the largest specialty makers of electric signs, we are constantly designing and building special signs. This particular electric sign has come into such great demand, however, that we are now making it in quantities on a standard basis. That's why we can offer you this high grade electric horizontal sign for the low mail order price of \$63.50—\$13.50 accompanying the order and \$10.00 a month thereafter till paid.

"Peppiest" Garage Sign color combination

The frame finish is three coats of flexible oven baked black enamel. The sign background is of weather proof gloss black. The letters are 12 inches high and are outlined in vivid color. This combination of black background, creamy white opal letters and red outline gives you an extremely attractive and "peppy" day-and-night sign. You can quickly swing one in front of your place of business if you will send the order today.

AMERICAN SIGN COMPANY
KALAMAZOO MICHIGAN

American "Garage Special" Specifications

Substantial sheet steel faces are electrically folded and welded by our own special process to sturdy steel frames. The size of the horizontal sign is 7 feet long, 2 feet high and 7 inches thick. The vertical sign is about 2 feet longer. Each sign is completely wired to comply with the requirements of the National Board of Fire Underwriters. There are 14 sockets, requiring 25 watt lamps.

This sign is a quality product in every respect—made in the same high grade manner and by the same organization responsible for the big "Sweeney" sign in Kansas City. In reality this is a **special job** sold by mail at a **quantity price**. It is the outstanding electric sign value in America today.

MAIL ORDER SAVINGS BLANK

American Sign Company,
Kalamazoo, Michigan

Date.....

Gentlemen:—

Attached find remittance for \$13.50. Ship at once one American Garage Special Sign as described, on following basis:

- ☐ Cash basis. \$13.50 herewith, balance when sign is received, less 5% cash discount on full amount.
- ☐ Monthly payment basis. \$13.50 herewith. \$10.00 each month until the total amount has been paid.

Send the following style:

- ☐ Horizontal, total price \$63.50.
- ☐ Vertical, total price \$73.50.

Make shipment to

Personal Name

Firm Name

City

State

(Write for Free Garage Sign Bulletins)



I am the **DALECO**

Trade Mark Registered

By Virtue of the Power Invested in Me
I Guarantee ———
To any Ford motor on which I am installed
Absolute Freedom
From ALL timer troubles

By Virtue of Pure Copper Contacts, and an electrical circuit composed entirely of brass and copper, a construction *exclusively Daleco*, I insure an intense white hot spark that causes instant ignition and complete combustion of the gas, resulting in maximum power and economy.

By Virtue of a Positive Wipe Contact, the oil film unavoidable in any timer requiring lubrication, is broken on the first turn and easy quick starting assured regardless of weather or oil in the timer.

By Virtue of a True Circular Rotor, free from humps, bumps or depressions I insure regular, constant ignition and perfect timing of all cylinders.

By Virtue of a Bakelite or Condensite case, (a material used in the highest class electrical apparatus) that is a positive non-conductor of electricity and impervious to oil and water, I eliminate all possibility of short circuits or current leaks.

By Virtue of the elimination of small revolving parts, *I require no oiling*. Just install me on your motor, then let me alone.

These are some of the outstanding features of the Daleco, the result of correct design, the best material obtainable and thorough workmanship, all backed by a positive Guarantee of perfect timer service at a cost of not in excess of fifty cents per year.

If you can't find me at your Dealers—write.

Manufactured by
DALE MANUFACTURING CO.
1323 Michigan Ave.
CHICAGO, ILLINOIS

Sales Department
THE ZINKE COMPANY
1329 Michigan Ave.
CHICAGO, ILLINOIS

An Entirely New Idea in Piston Rings

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Coated
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PIECE
PISTON
RING

ZELCOS wear to a perfect fit in less than an hour, simultaneously filling up scratches and porosities in cylinder walls. This glazes surface and retards ultimate wear. No other ring seats as quickly.

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ST. LOUIS



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SPEE-DEE

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

MAY, 1922

Vol. 13—No. 5.
10 Cents the Copy.
\$1.00 Per Year.



Every User is a Booster!

Over 20,000,000 inner tubes were permanently repaired with the simple Shaler 5 Minute Vulcanizer last year, and every user is an enthusiastic booster who recommends the Shaler to his friends.

It's easier than sticking on a temporary patch—quicker than changing tubes—the only satisfactory method of making permanent tube repairs, anywhere on the road.

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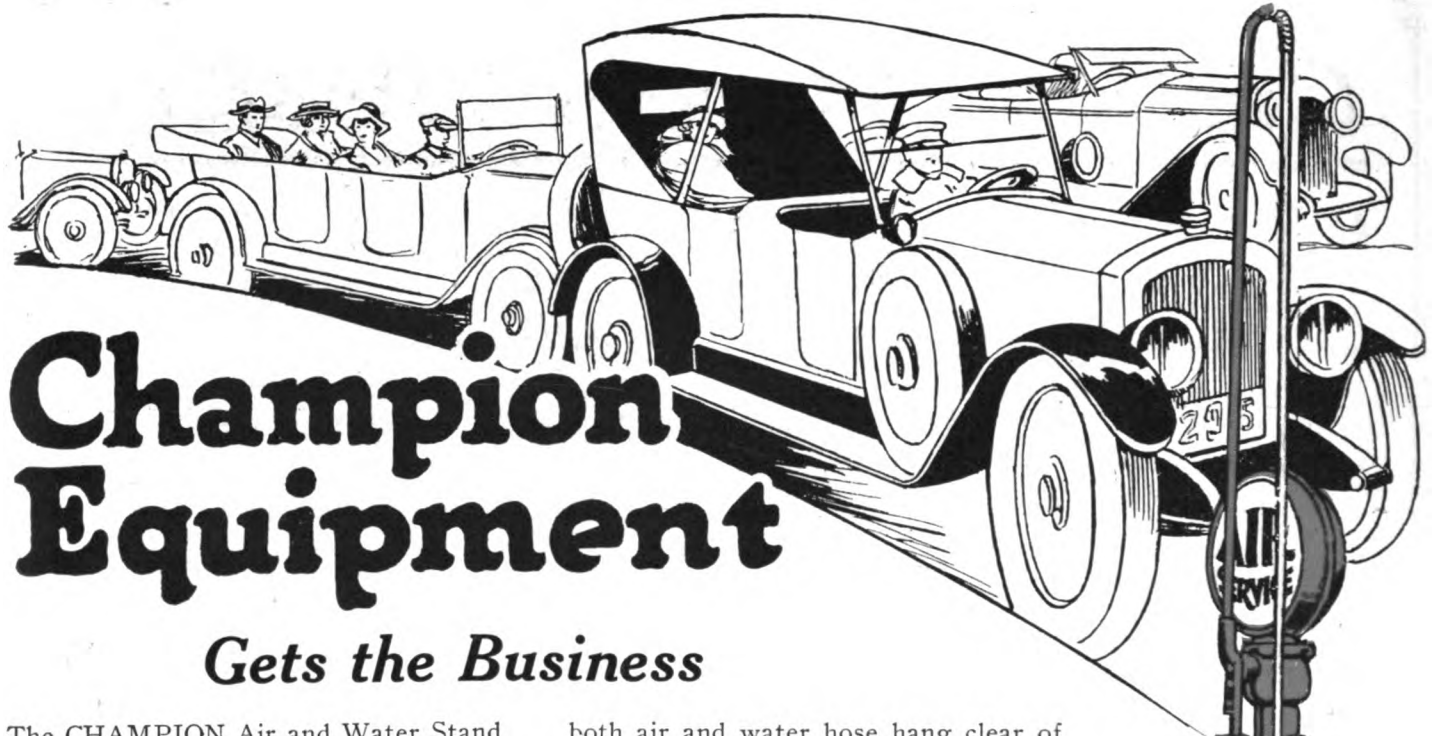
All Jobbers Sell It—Write for Window Display.

The Shaler 5 Minute Vulcanizer also repairs rubbers, rubber boots, hot water bottles, rubber gloves, coats, etc.

The Complete Outfit includes the vulcanizer and 12 Patch & Heat Units (6 round for punctures and 6 oblong for cuts) and retails for \$1.50—except west of the Rockies and in Canada. Extra Patch & Heat Units retail for 75 cents a dozen. Write now—for our new Window Display, Counter Display, Circulars and other Dealers' Sales Helps—Dealers' Discounts, etc.

C. A. SHALER CO., 354 Fourth St., Waupun, Wis.





Champion Equipment

Gets the Business

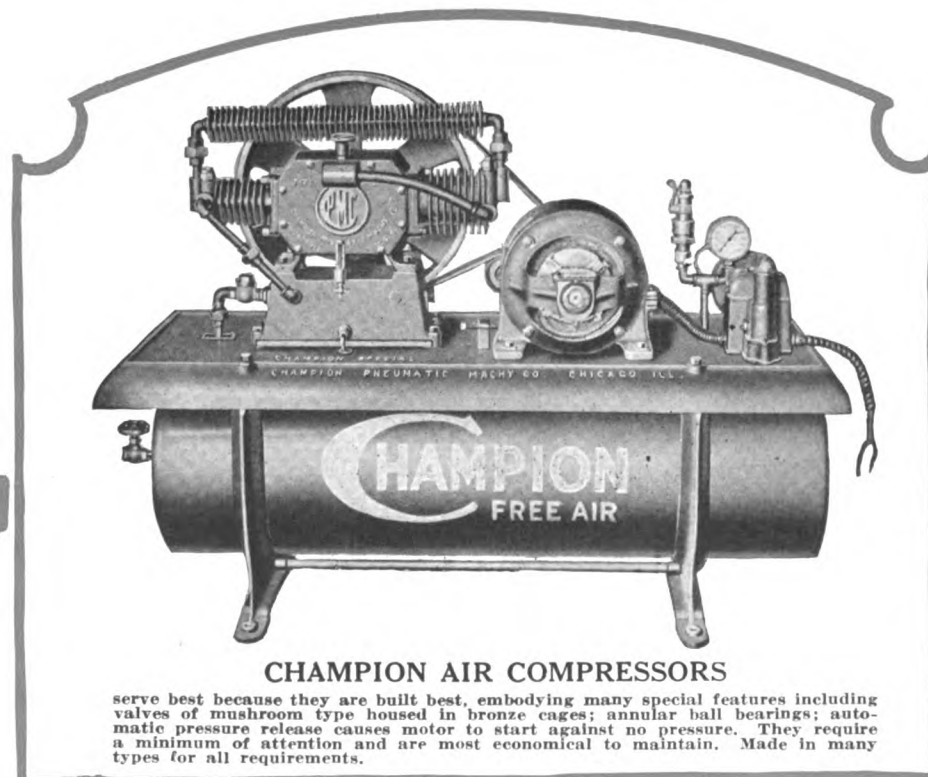
The CHAMPION Air and Water Stand is a winner. Motorists are attracted to service and filling stations having this stand because of its dignified, striking appearance. They are immediately reminded of the need of air and water and a new customer is made for other purchases. The CHAMPION is clean, as

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serve best because they are built best, embodying many special features including valves of mushroom type housed in bronze cages; annular ball bearings; automatic pressure release causes motor to start against no pressure. They require a minimum of attention and are most economical to maintain. Made in many types for all requirements.



Collect Storage Profits

GET full charges for all cars left with you for storage. With Comfort Garage Storage Tags in daily use you cannot lose a penny due you on storage.

Study the fac-simile shown here. Note how simply and adequately it is adapted to storage problems—how it assures collections. It leaves no chance for an automobile to be driven from your garage without every cent due for service in your cash box or charged on your books. These tags also record charges other than storage, due from service or supply sales.

| | | | |
|---|--|--|-------------|
| FORM 15 To be Tied on Car | | Number B670 | |
| Garage Storage | | | |
| Name <i>Thomas White</i> | | | |
| MAKE OF CAR <i>Dodge</i> | | LICENSE NO. <i>44114 Mo.</i> | |
| MOTOR NO. <i>486942</i> | | DATE LEFT <i>June 3</i> A. M. <i>5:00</i> | |
| CHARGES | | | |
| Storage 1 Days @ | | | <i>50</i> |
| Gasoline 5 Gals. @ <i>74¢</i> | | | <i>1 70</i> |
| Oil Qt. @ | | | <i>60</i> |
| Washes | | | <i>1 50</i> |
| CHARGES ON Repair Ticket No. <i>692</i> | | | <i>7 57</i> |
| CHARGES ON Tire Tag No. <i>450</i> | | | <i>1 00</i> |
| Date Called for <i>June 3</i> A. M. <i>5:00</i> | | Total Charges <i>7 92</i> | |
| Present this Check when calling for Car. | | | |
| Claim Check No. B670 | | | |
| ALL CHARGES C. O. D. | | | |
| Not Responsible for Loss by Fire or Theft | | | |
| COMFORT PRINTING SPECIALTY CO. ST. LOUIS, MO. ALL RIGHTS RESERVED | | | |

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Prices, F. O. B. Your City

| | |
|--------------------|-----------------------|
| 100 \$0.75 | 1,000 \$ 3.00 |
| 250 1.50 | 2,500 7.00 |
| 500 2.00 | 5,000 13.50 |

Printing name and address on claim check \$1.50 per thousand extra. If less than one thousand are ordered this printing charge will be \$1.50. For strings and wires for these tags, see catalog.

For those who may desire an additional office check on storage we supply Garage Storage Tag, Form 16. Sample on request.

*Write for our free book, bound in cloth,
"Making and Saving Profits"*

Comfort Printing Specialty Co.

109 North Eighth Street, Saint Louis, Mo.

COMFORT PRINTING SPECIALTY CO.
109 N. Eighth St., St. Louis

Please ship us..... Comfort Garage Storage Tags, Form 15.

Price \$.....

If name is to be imprinted add amount here

Please find check enclosed for Total

Name

Address.....

City..... State.....

If imprinting of name is ordered also, send this additional coupon.
Print out fully and plainly the exact wording desired.

Name.....

Address.....

City..... State.....

GEORGE K. CULP IS LOOKING FOR

100 DISTRICT MANAGERS

Who Are Now Engaged In Operating Their Own Automotive Tire and Supply Stores (No Agents)



We wish to affiliate with the central organization here in New York at least 100 more Culp-Plan Associated Store Owners as Culp-Plan District Managers. These men will continue to run their present business, but will also be in charge of allotted districts and will represent George K. Culp, Inc., in all things insuring the smooth operation of the Culp-Plan.

They will supervise warehouses—carry on Culp-Plan Associated Store development—and in every way represent us as District Managers.

These positions are permanent and will pay extraordinarily well.

Only Culp-Plan stores' owners are eligible as District Managers and if you are not already a Culp-Plan store owner we urge you to join (ask for the "Get Acquainted" form of agreement) at time of placing application for District Management.

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those dealers interested in becoming Culp-Plan stores should advise us immediately and those wishing to become District Managers should file applications at once, so that personal interviews can be arranged. Mr. Culp will carry full samples of the Culp-Plan approved products now manufactured by 24 nationally known Culp-Plan associated manufacturers. "Cost Bulletin No. 9" is in the mails now with still further radical price reductions. We advise quick action. Our slogan is "A Culp-Plan associated store in every town in America in 1922," and it is working out that way.

If you have not received "Cost Bulletin No. 9" by the time you read this advise us and this 24-page bulletin, showing revolutionary prices on the "Culp-Plan Approved" quality merchandise, will be forwarded "Special Delivery."

Thank You!

Co-operatively yours,

GEORGE K. CULP, Inc.

President

56 W. 45th St.
New York City

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



These Signs Stop 'em!

THE hundreds of cars needing garage service and the garages that can efficiently render that service always get together when a handsome American sign tells them—24 hours a day—that a GARAGE is at hand.

We are offering a "Garage Special" horizontal or vertical electric day-or-night sign at a low mail order price that will enable **every** concern in the garage business to enjoy its trade-winning power.

The American "Garage Special" is an attractive combination of black background, creamy white opal letters, with a red outline. The substantial sheet steel faces are electrically folded and welded by our own special process to sturdy steel frames. Size of the horizontal sign is 7 feet long, 2 feet high and 7 inches thick. The vertical sign is about 2 feet longer. Each sign wired to comply with the requirements of National Board of Fire Underwriters. There are 14 sockets requiring 25 watt lamps. Very special.

HORIZONTAL—\$63.50—\$13.50 down—balance in 5 monthly note payments.

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Cars everywhere are "taking to the road." Don't let them pass you by. Put up an American "Garage Special" sign in front of your establishment and make 'em come in. Simply specify on the coupon whether you want the vertical or horizontal model, attach your initial payment, and let us send you a sign that will bring you big business.

American Sign Company
Kalamazoo, Michigan

\$63⁵⁰— or \$73⁵⁰—

| HORIZONTAL COMPLETE | VERTICAL COMPLETE |
|------------------------|----------------------|
|------------------------|----------------------|

MAIL ORDER SAVINGS BLANK

American Sign Company
Kalamazoo, Michigan Date.....

Gentlemen:—

Attached find remittance for \$13.50. Ship at once one American Garage Special Sign as described on following basis:

Cash basis. \$13.50 herewith, balance when sign is received, less 5% cash discount on full amount.

Monthly payment basis. \$13.50 herewith. \$10.00 each month until the total amount has been paid.

Send the following style:

Horizontal, total price \$63.50.
Vertical, total price \$73.50.

Make shipment to:

Personal Name.....

Firm Name.....

City

State

(Write for Free Garage Sign
Bulletins)

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, *Editor*

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AMERICAN GARAGE & AUTO DEALER, Inc.

116 South Michigan Avenue, CHICAGO

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E. C. HOLE, vice-president.

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Reliable air service will do it.

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Wayne Compressors are made in five models to suit all needs. Won't you send for Bulletin 2000-AGD which describes these models?

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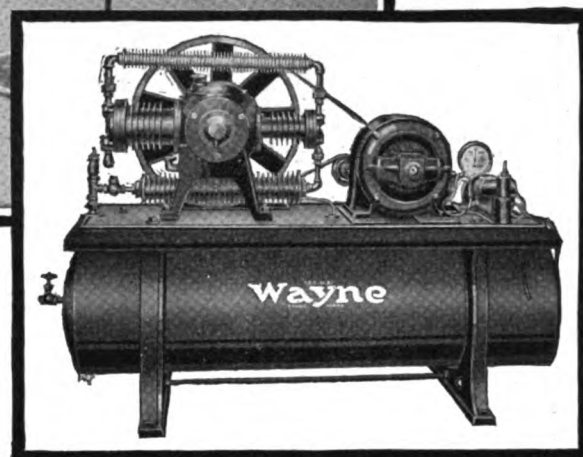
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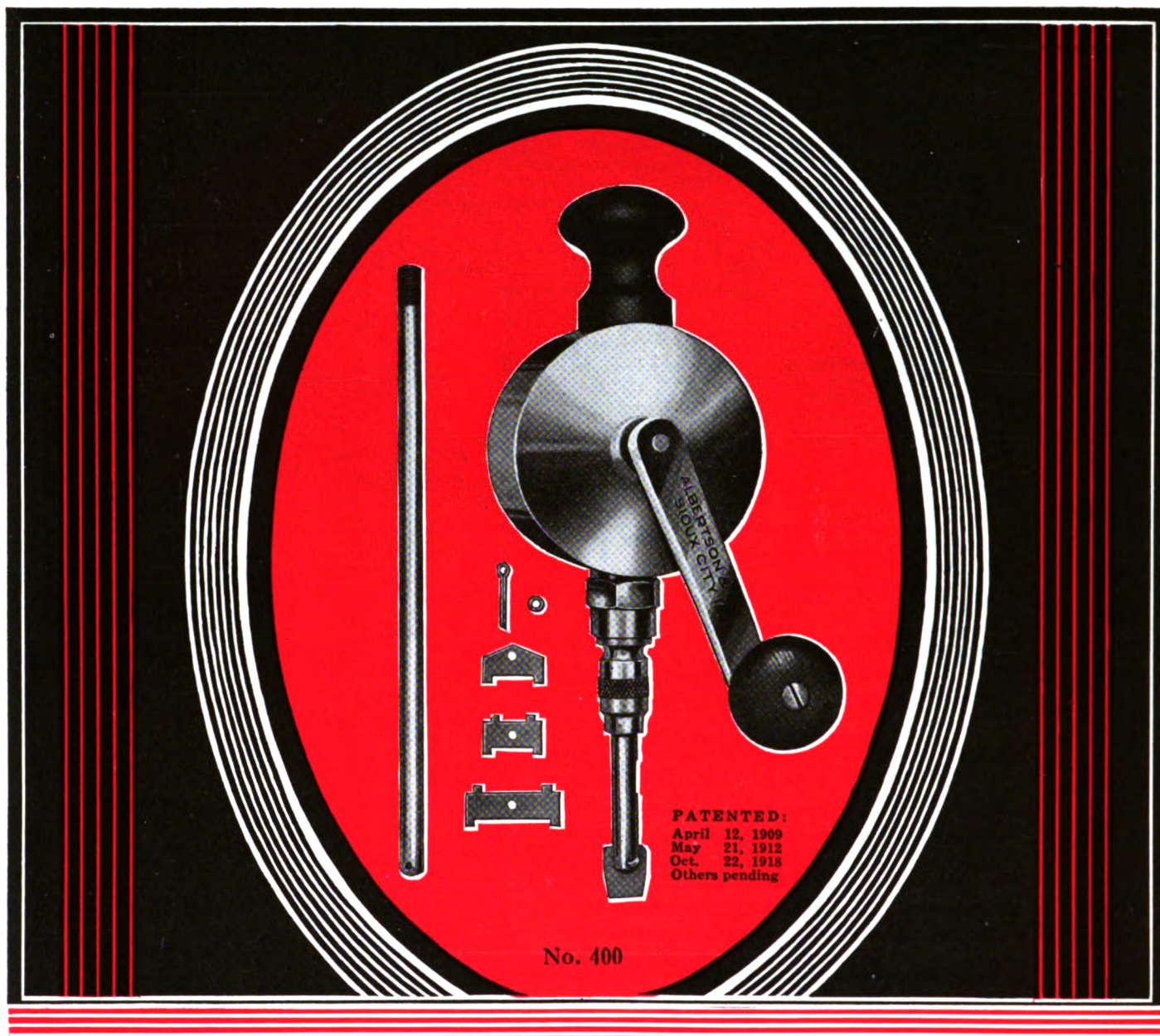


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Grinds correctly and quickly. You'll find them everywhere, in garages the world over—giving the utmost satisfaction.

The simple mechanism and the impossible-to-wear-out parts produce that reciprocating, or back and forth motion on the valve, so necessary for perfect valve grinding.

Your Jobber Sells Them

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American Garage & Auto Dealer

*A Business Paper Exclusively for the "Small-Town
Automotive Trade*

Vol. XIII. No. 5.

CHICAGO

MAY, 1922

Superior Service and Co-operation

Rhode Island Company Combines Car Sales Department with Operation of Real Service-Giving Garage and Repairshop—Finds Its Only Problem Is to Build Additions to Plant Fast Enough to Care for Increased Business

By J. E. Bullard

The Messinger Motor Co. solved the problem, as far as concerns itself, of selling cars and at the same time operating a garage and repairshop which renders the service that creates good will and adds to the profits and the growth of the business. In fact, about the only problem this company seems to have is to build additions to its plant fast enough to take care of the increase in business.

T. Sewall Messinger is president of the company, Raymond C. Keigwin, vice-president, and W. M. Van Ausdall, secretary and treasurer. The business is located at 150 Waterman Ave., East Providence, R. I., and during the past two years has had to make an addition which has practically doubled the available floor space. The business has grown so rapidly that it has been necessary to make plans for still further additions.

The secret of this rapid growth, right through an industrial depression, has been due to the superior service that is rendered to the car owners. The repairshop is always crowded with cars and often there are a number parked outside the building waiting for a chance to get in.

The reason such good service can

be rendered is that each man in charge of a department is an expert in his line, and the business is divided up into a number of different departments. Messinger devotes his attention to the selling of cars, the company being distributors for the Elgin Six and the Stephens Six.

His specialty is engines. He has devoted the greater part of his life to the study of automobile and airplane engines. During the war, he was in the aviation service. Since it is the engine that makes the car go, this knowledge and experience are of value in selling cars. He can tell people something about these engines and

accomplished marvelous results in cleaning a fire-tube boiler. He knows engines and he knows cars. As a result, people have confidence in what he says about the cars he sells just as people always have confidence in the statements of an expert.

Raymond C. Keigwin, who has charge of the garage end of the business has had something to do with automobiles for the past 12 years, and has had an experience that not only has taught him what kind of service the car owner wants from a garage but also how to give it. He knows what will please the owner and how to avoid costly service that might be given, but which the owner would not appreciate to the extent of its cost.

Fred Fournier, a man of 20 years' experience, is in charge of the repairshop. That is, he handles all of the mechanical work on the cars. The ignition and the radiators are taken care of in other departments.

These other two departments are in-

teresting, and suggest a way of giving good service—even before the business has developed to such an extent that it justifies the hiring of the highest type of man to take charge of the departments. As a matter of



Attractive Appearance of Establishment of Messinger Motor Co., Providence, R. I., Gives Hint of Its Up-to-Date Methods.

does not have to deal in generalities.

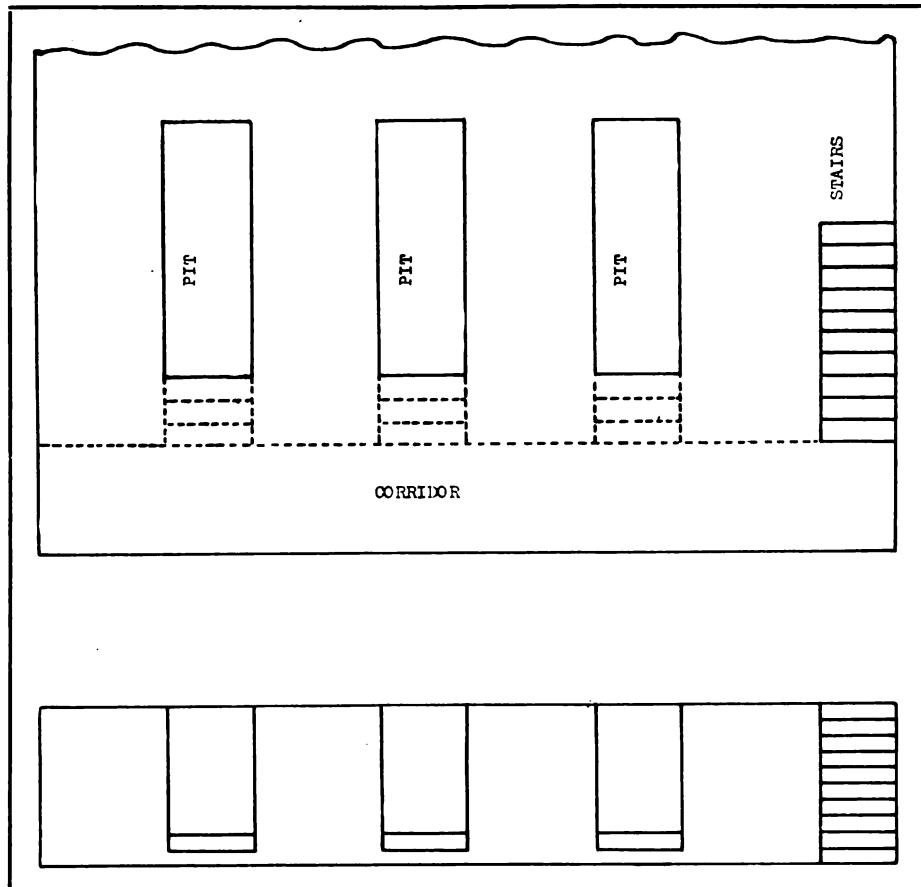
He never makes the mistake that a certain salesman for boiler cleaning tools made when he told some experienced engineers that the tool made for cleaning water-tube boilers has

The radiator repair company is operated by Robert J. Tyrrell, formerly

The plan is working out well, and it serves as a suggestion to other garagemen, who have a department in which they desire to improve the service, that it may be possible to im-

Daily Time Card Used by Messinger Motor Co.

In the repairshop there is something of an innovation in the way of pits. These were designed by Mr. Keigwin, and are certainly a long way ahead of the mere hole in the ground that has customarily been used as a pit, and



Innovation in the Way of Pits That Is Far Superior to Usual Hole in Ground.

which has resulted in laws being passed in a number of the states prohibiting the use of pits. These pits are well lighted by daylight and they are easy to enter.

Along one side of the building there is a corridor about six feet deep and five feet wide, extending the length of that side of the shop. Windows in the exterior wall admit the outdoor light. The pits extend to this corridor, there being three pits in all and each pit is two steps above the floor of the corridor. A concrete flight of steps on one side of the shop gives access to the corridor and the pits.

In case of fire the men are not trapped in pits. In fact, there is the minimum possibility of fire, for the pits are well ventilated. There can be no collection of gasoline gas in the pits since this will flow out into the corridors. If a fire does start for any reason, the workmen can quickly reach the corridor and run up the steps or, if necessary, climb out the windows to the outside air.

The only space occupied in this plan, that would not be occupied by the old style pits, is the stairway. The floor of the shop extends over the corridor. There are all the advantages of the pit with practically all the disadvantages eliminated, as one readily sees when he takes a look into these airy, well-lighted spaces.

The keeping of the records of the jobs has been reduced to the smallest possible number of forms. As Keigwin pointed out, the effort is towards personal supervision and away from red tape. One way in which the system used differs from that used in a great many garages is in the absence of the use of carbon paper and a number of copies.

A red card $6\frac{3}{4}$ ins. by 8 ins. is used for the job card. This has very little printing upon it which, by the way, is another respect in which it differs from many job cards. Across the top appears "Messinger Motor Company." Below are the words, "car owner" with a ruled line extending to a box two inches wide printed at the right of the card.

Under the name of the car owner is the address. Above the box at the right is the date, and in the box are the words "start" and "finish," one above the other and with a line long enough to stamp the time of starting and of finishing the job.

Next comes a double ruled line

across the sheet, beneath which are the words, "Description of Work." Under this are lines to the bottom of the sheet. On this card is written the whole history of the job, from the work that is required to the final totaling up of the cost of the job. What can't be placed on the front goes on the back. The red color makes it easy to distinguish this card from the time card of the employee, which is the same size but is white in color.

The time card is a daily card with a space at the right in which to write the name of the owner of the car, a space for the description of the work done, a space for the total hours of work spent on the job, and spaces for stamping in on the clock the time the job was started and when it was completed. The total of the hours worked by the employe on that day appears at the bottom of the card.

By means of these two cards, the bookkeeper is able to keep the records complete and accurate because the time cards indicate how much work has been done and the workman himself is going to see that his card is

[illegible]

Differs From Many Job Cards In Having Very Little Printing Upon It.

not lost and forgotten. That card carries a record of the work which has been done, and a little checking indicates whether all the red cards have been turned in. In spite of the simplicity of the system, it seems to be as complete and accurate as is needed.

It is the policy of the company to keep nothing from the car owner. Instead of keeping the owner out of the shop, he is allowed to enter it. He can watch any of the work that is being done on his car, his batteries

or his radiators. The only class of people excluded are those who are there merely to pass the time and have no work being done. It is naturally necessary to place some restrictions upon these people if the car owners are to be given the best service.

Department of Agriculture Motorizes Sheep and Poultry Schools.

Sheep and poultry schools, built on motor trucks and traveling through rural sections, have been organized by the United States Department of Agriculture in co-operation with the state colleges of agriculture of North Carolina and Texas.

Officials of the Department of Agriculture say that more of this method of education is needed, so that information on the latest farming methods may be carried directly to farmers, no matter how inaccessible the community may be.

Canadian Automobile Production Shows An Appreciable Increase.

There are slightly under 9,000,000 people in Canada. There are approximately 500,000 motor vehicles. This means one to every 18 inhabitants.

"The most surprising increase," said a provincial government official, "occurred in the western provinces. Saskatchewan which, but a comparatively short time ago, was a playground for the buffalo, today has 62,958 motor vehicles—mostly automobiles. Manitoba has 40,430, Alberta 38,750 and British Columbia 31,000.

"Western Canada's automobiles are not all passenger cars. On the contrary, thousands are used for the quick transportation of farm produce to markets. In the principal producing seasons nearly every car—large and small—is equipped with trailers for the movement of grain, fruit, live stock and dairy products.

The western provinces are being settled by small farmers who are pouring into the fertile region along the transcontinental lines of the Canadian national railways. They are going in for mixed farming. Dairying is favored because of the quick returns.

"The prosperity of western farmers in recent years has resulted in the increased use of all kinds of cars. Canada is taking advantage of this growing demand. Automobile production in Canada, according to the latest computation, was valued at \$137,420,351 in 1920, an increase of \$37,000,000 in 12 months. Investment in the industry is placed at \$53,906,506."

Does Selling the Side Line Pay?

Those Garagemen Who Think That They Cannot Sell Anything Outside the Automotive Line Will Find This Pennsylvania Dealer's Success with Side Lines Interesting—One Idea Made Room for Others Along Similar Lines

By K. H. Lansing

The small town garageman, or automobile supply dealer who is so "hide-bound" as to think he cannot, or ought not, sell anything outside of the automotive line, is missing a big opportunity.

It may be very well for the city concern merchandising automotive equipment to cry "shoe-maker stick to your last," but it was very noticeable that a good many of them tried out farm-lighting systems and other things not directly connected with their line when the pinch came, some time ago. Some of them made considerable of a success of the farm-lighting proposition, too.

While the farm-lighting plant is admittedly a good thing for the garageman, automotive dealer and motor car supply merchant to sell, if he has the money and the time to handle it, there are other propositions for him that do not require any outlay to speak of and which he may attend to as a side-line, or in spare moments when general business is dull.

Take the case of the Fernwood Auto Supply Co., of Fernwood, Pa., a settlement one block wide and about ten blocks long, containing somewhere around 1,000 inhabitants.

F. H. Haggett, proprietor of the shop, which is located fronting on a street-railway line connecting the place with numerous small boroughs, is fortunate in having the only establishment in the settlement which is devoted to the automotive equipment business.

Haggett was formerly a carpenter, and when he started in the automotive supply business—which was less than two years ago—he "didn't know a camshaft from a radius rod," so he says. But he saw his chance there

and absorbed the required knowledge as he went along, much as the boy who is thrown off the dock learns to swim—because he has to.

Haggett didn't even have the advantage of buying out an established business. He felt that he could "make

side. As motorists in this vicinity are prone to have decided preferences for brands of oil, he catered to this peculiarity by handling the products of several large companies.

Soon Haggett put in a stock of tires, finding it expedient to handle three brands to meet the demand. These are Hartford, Good-year and Hood. His sizes range from 30 by 3 inches to 34 by 3½ inches. Experience showed him that these brands and sizes were most in demand by his clientele. He carries only a small stock of each kind.

He made a neat triple-deck tire stand for his back shop, but makes a practice of displaying a few

things go," because he had looked carefully over the ground and found that there was a real need for a modern automotive equipment store. He knew something about buying, as he had bought lumber, tools and hardware for many years and, of course, he was used to selling materials and his services.

He began by stocking, with accessories and Ford parts, the front part of his space of 20 feet by 45 feet on the ground floor of an attractive, large building which had formerly been a hotel. He partitioned off a space 20 feet by 16 feet in the rear of his store for a repairshop.

His practice as a carpenter stood him in good stead, as he was able not only to make a really first-rate workbench with all the usual attachments for tools, but also was able to install extremely neat and well-made bins and shelving both for his salesroom and for the shop.

Next, Haggett set up gasoline tanks and an air supply in front of his store, and laid in a large stock of oil—purchasing a portable oil tank for out-

tires in his salesroom to catch trade. Haggett says the tire business is fair, but is steadily improving. He has sold as many as nine in a single day—which is doing pretty well for a community of about 1,000.

Then, of course, came tire repairs. He had some room in his shop for this class of work, but decided to vulcanize tubes only and to leave the "shoe" repairing end to "the other fellow"—at least until the demand should grow heavy enough to warrant his getting a first-class vulcanizing and retreading outfit for the purpose.

There are numerous workingmen and boys in the locality who ride bicycles and so, of course, the idea came to Haggett to repair bicycle tires. He now makes a neat little sum from this end of his business.

As it seemed to be somewhat slow in the general hardware trade thereabouts, Haggett thought he might "pep" things up a bit. Accordingly, he took on a few staple lines of hardware stock.

This seemed to work out pretty well.

(Concluded on page 15.)



Side Lines Helped to Build Business for Fernwood Auto Supply Co., Fernwood, Pa.

The Law, The Facts and The Garage

Do You Know You Are the Loser if Customer Is Permitted to Take Goods on Approval and Merchandise Is Lost or Destroyed Through No Fault of the Customer?—Difference Between This Transaction and "Sale and Return"

By Arthur F. McCarty

The season was passing, the time of fruition for many things of the vegetable kingdom was near at hand, and the Brown Garage & Auto Supply Co. was preparing for its harvest—the harvest of dollars from the early fall trade. To signify the season the show windows were decorated with sheaves of ripened grain scattered amid the articles on display.

Trade was lively and on the uptrend, and Elwood Brown was happy. Lawrence, his only son, had been home for the long summer vacation and would soon return to school. His father was looking forward to the time when the course would be over and the boy ready to settle down—he hoped it would be in business with himself.

Passing through his establishment, Brown drew near a counter where a woman was inspecting some tool kits. Pursuant to his custom of occasionally "listening-in," the proprietor paused nearby, and noticed that the customer was hesitant about a choice between several handsome sets which lay before her.

Presently the salesman offered to send several out to her home for the approval of her husband, for whom she was buying the tools as a gift. Her face brightened and she indicated four from which she thought a choice could be made, and went out. Brown returned to his desk, the incident leaving no impression upon his mind.

It was recalled the next day, however, when it appeared that the four tool kits were a total loss, as far as salability was concerned, by a fire which had broken out in the home of the customer over night. The husband had returned home very late and

Penlings from the Pen of Dike

They say: "Say it with flowers." "Save it with ice." I say: "Sell it with smiles."

Don't forget that the tourist season is here—now is the time to make ready. Remember the old saying—"Make hay while the sun shines."

We know business is getting better—Coco Cola is back to a nickel.

* * * *

"He who fights and runs away,
Will live to fight another day,"
So the old saying goes. Dike says:
"He who advertises every day,
Will cause the business to come his way."

* * * *

In Oklahoma City they have signs on the windshields of their cars.

One read—"Howdy. Half the road is yours." Another—"Look and Live."

Ever go into one of these United cigar stores, buy a good cigar and pay for it? What does the clerk say? He says: "Thank you." That's a rule of those stores.

Do your clerks say to the customer, "Thank you"? See that they do.

found it necessary to go to that lawyer's office to gain access to "the books." While there he talked it over with Updyke, and when he returned to the garage he was ready with the law governing the facts which had been related.

"It's your loss, Dad, it seems," he said. "When goods are sent out 'on approval' they remain the property of the seller, the title not passing unless and until the customer exercises his right of rejection or approval by taking them."

"The first thing to determine, when loss of goods occurs, is whose they were at the moment of loss. The second is: What is the duty of the person in possession? Now, the customer in such a case is called 'bailee' of the goods and

as such is bound only to the exercise of ordinary care, so that if they are lost or destroyed through no fault of his, he is not liable.

"This transaction differs from a 'sale and return,' in which the goods are really sold, but the customer having the right of return. In the latter case he must either return the goods or pay, being liable as an insurer."

"How about my insurance, can I collect on that?"

"Probably not," replied Lawrence. "I think your policies are the regular standard form which covers the goods only while they are in the premises described in the policies. Neither can you collect through the customer's insurance as that protects her against her own loss only."

At Lawrence's suggestion a new plan was put into effect in that place of business with respect to goods sent on approval. Thereafter the salesman

(Concluded on page 15)

had retired without inspecting the kits, intending to do so in the morning. In the meantime, the fire completely gutted the place and reduced thirty or forty dollars' worth of merchandise to so much junk iron.

"Well, who loses on the tool kits?" Brown asked himself. "I'll not say anything to Updyke about this, I'll just ask Lawrence."

That young man was starting for a tennis game, but he reported at the garage in response to his father's somewhat cryptic request for "advice of counsel."

Mr. Brown related the facts, repeating verbatim the salesman's words in offering to send the goods out. The young lawyer-to-be studied a moment.

"That comes under the law of sales, Dad," he said. "Before I give an opinion, I want to look it up in the books a bit."

So George Updyke got in on the case after all, in a way, as Lawrence

Accounting:

Balancing the Cash Account—Why Daily Posting of Journal Is the Better Plan—Use of Daily Balance Leaves, One Form of Which Is Illustrated, Insures Against Posting to Wrong Account—Method of Posting the General Ledger Accounts—A Suggested Working Schedule

By J. Newton Boddy, C. P. A. (N. A.)

Auditor, Accountant, Systematizer, Specialist in Automobile Accounting

As stated in one of the earlier articles, cash is represented by one account in the general ledger, the bank account being included in the cash account and the bank register on the cash journal being a memorandum account only. Keep this fact in mind and you will readily see how easy it is at all times to balance "Cash."

The use of a petty cash account of some kind is recommended always. If this plan is adhered to, all cash receipts will be deposited in the bank and all disbursements made by check. Therefore, your cash balance and your bank register balance must always agree when all cash on hand has been deposited.

It follows that, to prove cash, we must subtract our cash balance from the bank register balance to get the cash on hand. If this does not agree by actual count, your cash is "out."

Once a month—or oftener if necessary—we get our statement from the bank and check it against the bank register. This shows us the outstanding checks and deposits. To the bank statement balance we add the outstanding deposits and deduct the outstanding check. The result should be the same as the bank register balance.

Now, as the "Cash" is checked against the bank register daily and shown to agree with it, it must also agree with the bank statement after proper allowances have been made for outstanding checks and deposits. Remember that the total deposits for any period must

equal the cash receipts plus the cash on hand at the start of the period, less the cash on hand at the end of the same period.

The average bookkeeper has considerable difficulty getting his cash balance. The reverse of this ought to be true, for cash should be the easiest active account to keep straight. For those who cannot become accustomed to the newer methods, we still recommend the use of the "bank register," adding bank to our chart of accounts. Deposits are debits, checks are credits. The cash account is credited with deposits and the bank account is debited. The difference between the debits and credits of your cash account must then always be the cash on hand.

Some bookkeepers use separate books for cash receipts, check register and petty cash. "In the multiplicity of books there is confusion"—this applies especially to an accounting system.

Petty cash disbursements should be distributed daily from the petty cash slips. Petty cash may be cleared daily or as often as is found convenient.

This is done by drawing a check for the amount of the petty cash payment for the period, charging petty cash and crediting cash for the amount of the check. Most bookkeepers distribute to petty cash disbursements when they draw the check. This practice, though common, is not to be recommended.

There are a great many "don'ts" which could be listed for your guidance in these matters, but we have found that it pays to stress a few "don'ts" rather than to enumerate a quantity and have them carelessly disregarded or forgotten.

Posting the Journal.

A journal is a book for the daily recording of business transactions. It naturally follows that the ideal way to keep a journal is to post it daily. To do a little at a time and do it accurately is a much better plan than to try to do a lot at one time in the belief that you are saving time. It is true that some time may be saved, but it is generally at the sacrifice of accuracy.

In the final reckoning, no time is saved but rather time is lost, as extra time is being used when it is most valuable—at the end of the week or month. It is much easier to locate five errors in every day's postings than it is to locate only five errors in a whole month's posting, or even in a week's postings.

If the daily business is not posted continuously—that is, each transaction as it is completed—but is carried until the afternoon or the next

Opposite Page of This Daily Balance Form Is Cut About Two Inches Narrower to Avoid Re-writing Names of Accounts When Page Is Turned.

day, it is best to establish a working schedule which, of course, may be varied to meet special conditions.

The accounts which should always be posted to the journals first are: Cash receipts, cash disbursements, sales tickets, purchase invoices, work orders and time cards. Post from the detail journals to the cash journal so as to establish the balances on the general ledger accounts. Then, when you have posted to the detail ledger accounts and have balanced them, you will have general ledger accounts balances by which to verify your ledger postings.

Foot your cash journal daily if possible, and make sure that the total debits and total credits agree. When this is done transfer the daily totals of the various general accounts to the daily balance leaves, a form of which is illustrated.

Daily Balances.

In listing your accounts, follow the chart of accounts as shown in earlier articles: Assets, liabilities, income, expenses.

Following an accounting period, the asset and liability accounts will be the only ones having a balance. As the sales and expenses are posted from day to day, the operating accounts become active and the daily balances soon assume the form of a regular trial balance from which is obtained, after the monthly and adjusting entries are made, the financial statement or balance sheet and the operating or profit and loss statement.

This form of daily balances is very elastic, and can be used equally well as a periodic trial balance, balance sheet and operative statement. It is equally useful in making perpetual trial balances of the detail ledgers, accounts receivable, accounts payable, expense, department sales, department inventories, etc.

The accounts may be written horizontally or perpendicularly in the item column, or vice versa. The more popular method of writing the ledger accounts is the vertical form. Without change of form it is reducible to a balance sheet and operative statement, and gives one at all times a visual statement in a small compass. It is more easily posted and proven, with the exception of the month end, when the horizontal method has a slight advantage in that one respect only.

The use of a daily balance form is the greatest insurance against posting to the wrong account that a bookkeep-

er can possess. It will show up an error of this kind instantly. A bookkeeper may easily transfer merchandise footings to the sales account and still preserve a balance, but the minute this happens the error would be evidenced in the difference in the balance of the merchandise or sales accounts on the ledger and in the daily balances.

Working Schedules.

Every bookkeeper ought to establish a working schedule of some kind and adhere to it as closely as possible. Change it around until you find that it suits the particular circumstances best, and then stick to it. Make a timetable similar to the following:

- Check night men off.
- Balance cash.
- Open and sort mail.
- Record cash receipts.
- Assemble and post previous day's business not posted.
- Post time of night men.
- Make deposit. Balance cash.
- Foot journals and sales records.
- Post general ledger. Miscellaneous accounts.
- Post cash journal footing to daily balances.
- Post customers' ledger, vendors' accounts, expense accounts and all detail ledger accounts.
- Answer letters.
- Check gasoline.
- Etc.

Posting the General Ledger.

The only general ledger accounts to be posted daily, especially when daily balance leaves are used, are the miscellaneous accounts. Even these may be segregated and posted at the end of the month from the cash journal to the general ledger.

All other cash journal accounts need to be posted only once, at the end of the month. When they are posted and the balance sheet extended, they are checked against the balances on the daily balance sheet and so proven. Six daily balance leaves a month will provide for 31 daily balances, a monthly financial statement and a profit and loss statement.

If those who are interested will send in their chart of accounts, we will gladly outline the daily balance system for them and start them in its use.

Our next article will take up the profit and loss statement, how derived from the trial balance; the balance sheet, or statement of assets and liabilities, and how derived from the trial balance; and what is to be learned from a trial balance, operating statement and balance sheet.

Special Dynamometer Determines Power Loss in Tires.

The rubber laboratory of the U. S. Bureau of Standards is equipped with a special dynamometer for determining the power loss in automobile tires.

Some interesting figures have been secured as a result of this work. For instance, an average 4-inch fabric tire, under conditions of normal load and air pressure, will absorb approximately 0.90 horse-power due to rolling resistance at a speed of 25 miles per hour. Under the same conditions, the power loss in a 4-inch cord tire is approximately 0.60 horse-power, while a 5-inch cord tire represents a loss of 1.20 horse-power.

The extent to which different parts of the tire contribute to the power loss has also been investigated. It is estimated that from 80 to 85 per cent of this loss is in the carcass, the tread contributes 10 to 15 per cent, and the tube probably less than 5 per cent.

THE LAW, THE FACTS AND THE GARAGE.

(Concluded from Page 13)

would say something about like this:

"We will be glad to send this out subject to approval, making the regular charge for the amount, credit to be given for whatever is returned in good order."

That made it a "sale and return" with risk of loss passing to the customer. If the customer was not entitled to credit, a cash deposit was required, of course. Thereafter the Brown Garage had no further trouble on that score.

DOES SELLING THE SIDE LINE PAY?

(Concluded from Page 12)

Then he noticed that people in the neighborhood had difficulty in getting anybody to sharpen their saws and files. He knew how, so he volunteered to do it—for so much per "do."

But that isn't all. One idea makes room for another along similar lines. Speaking of sharpening things, Haggett noticed that some of the lawn mowers thereabouts weren't functioning at concert pitch, so to speak, and he put out a sign that he sharpened lawn mowers so that they actually cut grass, instead of merely pinching it. A lively custom followed.

The moral is that the automotive man who keeps his ears and eyes open, and who is capable of sometimes thinking in other than automotive terms, can pick up a neat trade on the side to help tide him over dull periods, if nothing more.

Restraint of Trade in Patent Rights

What Rights Are Conferred by Law Upon Owners of Patents?—Can Resale Agreements Amount to Restraint of Trade?—These and Other Questions Which Will Be of Interest to Garagemen Are Discussed in This Article

By Chesla C. Sherlock

The Constitution of the United States expressly gives to Congress the power "to promote the progress of science and the useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." Patent rights, then, insofar as they extend, have their origin in the patent laws and in the interpretation of these laws by the proper judicial authorities.

Because of the rapid development of our country in an industrial way, the right to patents has been a constant source of litigation even from the earliest times. The fact that there was commercial development at all is sufficient to show the reason why there has been a mad scramble for anything resembling a means of monopoly or freedom from competition.

At some stage of our judicial history, the lower federal courts arrived at a wide difference of opinion from what had come to be the settled law of the land, as announced in the decisions of the United States Supreme Court. The conclusion that the enforcement of "patent rights", as they are understood in view of the lower courts' interpretations, amounts to a restraint of trade is obviously contrary to the interpretations of the supreme court, and we will divide the matter into two heads and allow the reader to draw his own conclusions.

It has been said in numerous decisions of the lower courts, that the patent confers with it an absolute monopoly on the right to use, make and sell the patented article. Since this right is grounded in patent law, so long as it does not conflict with the police power of the state, the government must protect the patentee in its exercise.

It is further said that since the owner of the patent acquires a monopoly, he can do as he pleases in the exercise of that monopoly and can limit the sale, the use or the manufacture of the article in any way he sees fit; that in so doing he cannot be guilty of restraint of trade, the government having expressly guaranteed to secure him in his right of monopoly.

It has further been pointed out that the patentee can patent his invention and then refuse to use, make or sell it to others. He may refuse to do anything at all with his invention, and there is no power that can compel him so long as the life of the patent exists. In one decision it was said that the cries of "restraint of trade" would not be heard because the Constitution, in attempting to promote the useful arts and sciences, created this very monopoly against which people are now crying out.

It is not our purpose to mislead anyone about the law upon the subject. We acknowledge that these opinions are held by most of the lower federal courts, which have passed upon the majority of patent cases during the past 20 years. But for some reason or other, these cases have failed to find their way to the United States Supreme Court. In the event that they had reached that tribunal, we are of the opinion that the cases granting the right to patentees to virtually restrain trade and stifle competition or to control prices would be overturned.

A fallacy has crept into our consideration of patent rights, and that fallacy has its root in this: A patent *does not confer* the right to make, use and *sell* the patented article for a period of 17 years. It cannot confer that right—simply because the right exists in every man to make, use or sell an article, so long as some one else has not patented it. The inventor has the right to make, use or sell his invention independent of any issuance of letters patent.

Then, if the patent does not confer this right, what does it do? It merely gives the patentee the exclusive right to exclude others from doing these things. There may not seem to be a great deal of difference between the two, but it is a difference worth searching for.

Since the right to make, use and sell a given invention exists independent of any patent right, it is obvious that the right to do these things must not come from the patent law or the "monopoly" granted by it. It is, in fact, a com-

mon law right exercised by every man, antedating constitutions and statutes on the subject—a "natural right" as Justice Miller expressed it.

In one case the court said: "A patent does not even confer the right to use the invention. It is merely an incorporeal right to exclude others from using the invention, conferred by the government upon compliance with certain requirements, and is transferable according to the laws of its creation which the state statutes cannot affect. Patents can be reached under the bankruptcy law, because they are wholly subject to the laws of the United States."

Chief Justice Taney, in 1852, in a decision which seems never to have been overturned, said: "The franchise which the patent grants consists altogether in the right to *exclude* everyone from making, using or vending the thing patented without the permission of the patentee. *This is all that he obtains by the patent.*"

"When he sells the exclusive privilege of making or vending it for use in a particular place, the purchaser buys a portion of the franchise which the patent confers. He obtains a share in the monopoly and that monopoly is derived from and exercised under the protection of the United States.

"The interest he acquires necessarily terminates at the time limited for its continuance by the law which created it. The patentee cannot sell it for a longer term. The purchaser buys with reference to that period—the time for which the exclusive period is to endure being one of the chief elements of its value. He, therefore, has no just claim to share in a further monopoly subsequently acquired by the patentee. He does not purchase or pay for it."

In the next article the trend of the decisions of the lower federal courts in recent years will be discussed and how they have departed from the idea originally held by the supreme court when it was deciding the bulk of the patent cases.



Current Comments and Observations

By The Editor

General Betterment Reported.

Reports from automobile manufacturing centers indicate production of motor cars is greatly in excess of what had been planned. Several plants are in record production and are not able to supply the full demand for cars.

Detroit reported that last month employment in the automobile industry in April was 70 per cent of normal while the general percentage of employment was 65 as compared with 30 a year ago.

The upward swing of sales in January, February and March was sharper than the normal seasonal jump for that period of the year. The April figures show excellent gains over the preceding months, one company reporting its sales equal to more than half its total business for the first six months of its fiscal year beginning September last.

About 300 representative executives are of the opinion that financial conditions in the automotive industry are not only gratifyingly better today than they have been in almost two years, but also indicative of a steady improvement for the rest of 1922.

* * * *

Motor Service and Good Roads.

Good roads pay—that has been demonstrated in Wisconsin and now figures from Connecticut add to the evidence.

According to estimates issued by Connecticut's State Highway Department, passenger service valued at more than \$17,000,000 a year is rendered by passenger automobiles passing in and out of Connecticut, where the state boundary lines are crossed by the New York-Boston turnpike, according to estimates issued by the State Highway Department. It would cost more than \$5,000,000 a year to transport over the railroads the freight which annually passes through these gateways of the state on motor trucks.

These figures were determined by traffic censuses made at Thompsonville and Greenwich. In the census at Thompsonville the daily average of passenger car movement for 24 hours was 2,907, or an average of two a minute.

Figuring the value of passenger service

rendered at the railroad rate of 3.6 cents a mile, the passenger service on the Hartford-Springfield road during the two weeks of the census was valued at \$327,595.

At Greenwich the value for the two-week interval was \$355,417. On the two roads together, the value of the service rendered for a year would be \$17,238,326.

* * * *

Playing For Safety.

Reducing the accident list, due to the great increase in the use of motor vehicles, is being given most serious attention this

MAN GETS WHAT HE GIVES.

The amount of pleasure that there is in this world can never be measured. The philosophy of life is reciprocity and a man gets what he gives.—Chauncey M. Depew.

spring by the public generally and the motorists in particular.

Publicity directed both to pedestrians and to motorists was featured this month in many cities throughout the country. In stores and in other public places signs were displayed bearing pertinent "Safety" admonitions such as:

"Cross the Street at the Corner. Don't be a 'Jay-walker'!"

"Look before You Cross."

"Drive Carefully," in big capital letters.

"Always Give the Hand Signals." A majority of accidents are caused by failure of driver to give the hand signals.

"Test Your Brakes," "Give the Pedestrian a Chance," "Watch the Car Ahead," "Slow Down," and "Obey the Law," are all words of advice that, if heeded, will do much towards keeping motorists out of difficulties.

There are reckless drivers who have absolutely no regard for the rights of others, either through lack of caution or through malicious intent—and these are to be "tagged" with a distinguishing name the same as the careless pedestrian has been labelled as "jay-walker," according to plans of the American Automobile association.

It's all in the way of "making the streets safe for everyone"

Advertise Liberally But Judicially.

"The fact that a revival in agriculture," said Governor Harding of the Federal Reserve Board in an address before the Southern Wholesale Dry Goods Association, "has come much sooner than had been expected by those who regarded the low prices of last summer as permanent, affords basis for the belief that there will, in due time, be a distinct business improvement in those districts.

"In view of the evidences of improvement which now are apparent, it seems to me the time has come when enterprising business men may well let others indulge in lamentations and recriminations over the last and devote their energies to working out the problems of today and preparing for the business of tomorrow.

"If business is dull, send out your traveling men; use printers' ink—advertise liberally but judiciously—and the business you thus create will stimulate production and, by reducing the number of unemployed, will add to the purchasing power of your customers."

In order to get business, effort must be exerted and advertising exerts a mighty effort. Remember that Samson used two columns—and brought down the house. Advertising is stronger now than it was in his time.

* * * *

More Car Owners, More Business.

Competition with the Ford in its own particular small car field, was announced last month by the Durant Motors, Inc.

The car will be a smaller variety of the Durant Starr car, the price of each model to be the same as that of the corresponding Ford model. Deliveries will begin June 1.

It is generally recognized that the more competition there is, the more a business develops. Certainly the advent of a new low-priced car should increase the number of car owners—and the more car owners, the greater number of customers for accessories and the services of the garage-man.

"How do you find business?" is a common query—but how often is the reply given "By going after it"? That is the real way to find it.

One Dealer Sold Them All—Why?

In the Beginning Bassett and Dodge Drove Cars of Different Makes from That Driven by Haynes—Now They Drive the Same Make Although Not as Good a Car as the Cars They First Bought—"Service" from Buyer's Viewpoint

By J. N. Bagley

It is very doubtful if conditions in and around Soda Springs differ to any great extent from those in other towns and localities where cars are used. A good many of the smaller towns and villages do not have car dealers, and folks who have been exposed to the "incurable fever" go to a larger town or city to buy their cars. Such was the case in and about Soda Springs.

There being no dealer at the Springs, all the cars in the neighborhood were purchased at the county seat of the dozen or so dealers. The first year or so there were to be found eight or ten different makes and models. The next two or three years found nearly all the car users driving a particular make of car.

The particular car was not any better than some of the other cars tried out and possibly not as good as some of them. And, on inquiring into the whys and wherefores, there was but one solution to the whole affair.

In the beginning, the different people went down to the county seat and purchased cars that appealed to them in one way or another. There were ten or twelve different makes and models in the country in the first twelve or fourteen months. Today there are, in this particular neighborhood, about 150 cars, and 95 per cent of them are made by the same manufacturer.

Jim Haynes drives a late model car of the same make he had when he began using cars. While Bassett and Dodge each started with different models they, like many others, now drive cars like that which Haynes is driving.

This is Jim Dodge's own story of how he came to change models. So far as cars were concerned, he liked the one he first purchased much better than the one he now owns but service—dealer service—converted him.

There were 22 long tiresome miles between the county seat dealer's shop and Jim

Dodge's place. A couple of months after he purchased his car he had the misfortune to break an axle and a drive-shaft.

These were ordered by mail, through the dealer. It was during the busy season and a couple of weeks passed. One night it rained most of the night and in the morning Mrs. Dodge volunteered to go for the parts while Jim made a fence and puttered about doing up the odds and ends that are usually neglected during the busy season on the farm.

Mrs. Dodge got rather a late start for the county seat and, owing to badly washed-out roads, etc., did not arrive at the dealer's place of business until 15 minutes past six in the evening—and it was closed. Going to a neighborhood telephone, she called the dealer and asked if the necessary parts had come for their car. The dealer replied that they had been there for several days, but when asked to come down so that she might get them, he snapped back: "My hours are from seven to six. You should have been here before six o'clock."

towed into the county seat some time later.

The same spring that Jim Haynes purchased his car, Bassett bought one of another make. As it happened, the first month the cars were out, each of the top coverings went to pieces. Each man went to his respective dealer to have the matter taken care of.

Jim Haynes' dealer met him at the driveway, looked the top over, and told Jim to drive the car in and have a new top put on, and he would take the matter up with the factory.

Bassett went to his dealer and called his attention to the top. His dealer told him that he would take the matter up with the factory and would see what he could do. Bassett drove the car with old top all summer while the dealer was trying to see what he could do. The next spring Bassett disposed of his old car and now drives a car of the same make as Haynes drives.

Dealers come and go down at the county seat, but the dealer who sold Bassett, Dodge and Haynes is still at the old stand. The

car he sells is no better and possibly not as good as the other cars sold in the city, but he has won an everlasting friendship through his methods of doing business.

For miles about he is known by his nick-name which he acquired honestly—"Quick Service."

It is mighty hard to go into a community where cars are used and not find some particular car taking the lead. When the reason is sifted out, in 99 cases out of 100, it is service and not the car that has been responsible

for the large number of sales made.

The writer also happens to know about a dealer at the county seat who sells a very popular make of car—or at least he tries to. He has driven many a good prospect away because of his "big feeling self," as it were.

One particular instance of which I am reminded, was that of two well-to-do farmer lads who were given \$3,000 for the purchase



This is One Dealer's Idea of Displaying Cars—Attractive, Isn't It?

Before Mrs. Dodge could offer any apology for being late, the receiver was snapped back on the hook—and she went home without the parts.

The next day Jim Haynes and Jim Dodge went to the county seat together in Haynes' car and Dodge bought a car like the one Haynes was driving, trading his car in on the deal at a great sacrifice. Dodge never did go for the parts and the old car was

of the car of their choice. They knew nothing about cars, but had read about a particular car in some of the national publications and had decided to buy that car, if they could find it at the county seat. They were directed to the dealer and straightway went down.

No one was in the showroom when they went in, so they began looking the car over. One of them climbed behind the wheel to get a little imaginary sensation and the other raised the hood to take a look at the things that "made 'er tick." Just then the dealer came in. He walked over and took the hood from the prospect's hands, closed and hooked it and invited the other brother to get out of the car, saying that if he wanted to lounge, to go to the hotel.

This dealer—if I be permitted to call him such—lost a \$2,750 cash sale and the friendship of one of the most highly-respected families of Soda Springs. Yet the manufacturer of this high-class car leaves the

agency with him month after month, when he only occasionally sells a car.

Many a good car, deserving of universal popularity, has been crowded out of a certain territory because of some narrow pin-headed dealer who represents the factory and who, because of his methods of doing business, would cause a graven image to leave the city.

It seems that, if dealers' methods were checked more closely by the manufacturer, there would be less of the condemning of a certain car in some particular territory. The "Ask 'em to buy" slogan was a dandy, but someone should give birth to another along the line of "Take care of 'em" after they do buy.

Not long since, the writer happened to be delayed in a neat little city of 15,000 inhabitants where there were 12 or 15 makes of cars represented by as many different dealers. Just to pass the time, a number of townsmen were asked where would be

the best place to go to buy a new car.

Eight out of ten of those asked referred me to a certain dealer. I asked if his car was better than the others, and every father's son of them acknowledged that many of the other cars were better, but they all mentioned this particular dealer's service rather than the car.

One old man I met, who was too wobbly to walk a crack four feet wide, said he couldn't drive a car if he had one, but if he could, he would buy it of B——, for if anything went wrong it would be taken care of "Johnny on the spot."

"That's right, stranger," he added, as he wiggled along down the street, chewing a cigar stub and cracking his cane on the cement walk. In these days of better merchandising if a merchant doesn't have service to sell along with his merchandise, he might just as well crawl into a hole, drag the hole in after him and get out of the way, for folks demand "Service."

A. E. A. Issues Universal Catalog

Universal Catalog Decided Upon at November Meeting Being Issued to Association Members—Descriptions, Illustrations and Price Quotations on Products of Many of Its Manufacturer Members Included—A Buyers' Guide

Back in November, when the Automotive Equipment Association held its meeting, that body decided upon the preparation of a universal catalog, its preparation to be financed by the manufacturers who were given space in it.

This work was undertaken as a means of affording co-operation in business-building between the two classes of members of the association and between individual members in each class.

The book has now been completed and is being furnished to the members of the association. The book is 12 inches high, 9 inches wide and 2 inches thick, and contains the announcements of manufacturer members of the association.

Descriptions, illustrations and price quotations on the products of many manufacturer members of the association are included in this catalog, and the compilers, in preparing the book, kept the idea of convenience to the buyer always in mind.

The catalog is divided into seven classifications, which are: Body equipment, chassis equipment, electric equipment, garage equipment, sundries, tire supplies and tools.

Each of these major classifications is thumb indexed so that the buyer, without hunting for page numbers, may turn to the class of equipment in which he is interested. There he will find the products of manufacturers in this class following one another in alphabetical order.

At the back of the catalog is a manufacturers' index and a producers' index, the former printed on blue paper and the latter on yellow, the remainder of the book being

in white. The manufacturers' index lists alphabetically the names of manufacturers presenting products in the catalog, giving the page numbers where their products will be found listed. Several pages at the end of each division have been left blank as memorandum pages for the jobber buyer using the catalog in his work.

Some idea of the great number of articles listed can be had from the following partial list taken from the first classification—body equipment:

| | |
|--------------------|-------------------|
| Auto webbing | Hood lacing |
| Backing lamps | Hood lamps |
| Batteries | Horns |
| Battery boxes | Lamps |
| Body lace | Lamp brackets |
| Bolts and nuts | Lamp doors |
| Braces | Lamp reflectors |
| Bulbs | Lenses |
| Bumpers | License brackets |
| Canopies | Lining panels |
| Curtains | Locks |
| Curtain fasteners | Luggage carriers |
| Curtain lights | Luggage carryalls |
| Curtain windows | Luggage racks |
| Cushions | Mats |
| Dash lamps | Mirrors |
| Dome lamps | Parking lamps |
| Dome lights | Pedal grips |
| Door covers | Radiators |
| Door pockets | Radiator caps |
| Draft shields | Radiator covers |
| Fenders | Radiator hose |
| Fire extinguishers | Radiator lace |
| Flashlights | Radiator meters |
| Floor mats | Rain shields |
| Head lamps | Rear curtains |

Not only does the catalog provide a buyers' guide, but it is also intended to give the jobbing members of the association descriptive material regarding the products shown, properly illustrated for catalog purposes. The catalog committee will serve as a clearing house for jobbers desiring pages of the catalog for reproduction in their own catalogs used in selling to the retail trade.

Automotive Equipment Association Announces Convention Schedule.

The Automotive Equipment Association has announced the dates for its spring convention as being June 19-23, the convention to be held at Colorado Springs.

A booklet which contains much valuable information as to special train schedules, Pullman rates, return routes and side trips has been sent out by the association.

Three special trains will be provided for the delegates for the trip to the convention, the first, known as the Chicago Gateway, leaving Chicago June 17.

A like train will be run from the St. Louis and Kansas City gateways, accommodating people in the South and Southwest. This will leave St. Louis June 17. The association members from New York, New England, New Jersey and Eastern Seaboard points will travel on a special train of the New York Central leaving New York Friday, June 16, arriving at Chicago, Saturday, June 17. This train will be switched through the yards and will arrive at Colorado Springs June 18.

Ignition Coils and Generators

Two Methods Used to Produce Flow of Dynamic Electricity—The Induction Coil: What It Consists of and How It Operates—A Simple Battery System Illustrated and Described—Functions of Condenser in Ignition System

By J. R. Bayston, M. S. A. E.,
Automotive Director, Coyne Trade & Engineering Schools

The first article of this series took up a number of principles dealing with the production of magnetic lines of force and different properties of electrical units and the

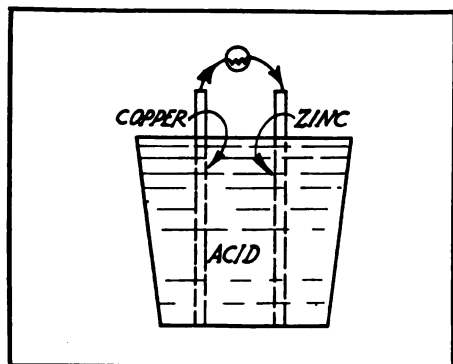


Fig. 1. Metal Plates Immersed in Acid.

handling of Ohm's Law. This article deals mainly with ignition coils and generators.

There are two methods used to produce a flow of dynamic electricity. The first is by chemical means and the second is by mechanical means. The general form of a chemical producer consists of two metal plates immersed in an acid, as shown in Fig. 1.

These plates must not only be of different kinds of metal but they must also carry a different electrical charge. For instance, one must have a positive charge, while the other must have a negative charge. Keep in mind the fact that every element or material has an electric charge of either positive or negative electricity. Zinc, for instance, carries a negative charge while copper carries a positive charge.

Every substance consists of millions of molecules. A molecule is so small that we could place a billion or so of them on the point of a needle. Each one of these molecules is divided into atoms and every atom carries a number of ions or electrical charges. Some materials liberate the ions more readily than the others. That is why certain materials are used for the production of electric current by chemical means for commercial usage.

A chemical producer is a very simple device. One may easily be constructed by immersing a solution of sulphuric acid, a strip of zinc and a strip of copper placed in an ordinary drinking tumbler. When the acid attacks the plate, a number of the ions are liberated from the metal, just as the abrasive compound of sandpaper is shed when water is applied to the sandpaper. There can, however, be only a certain num-

ber of ions liberated before a coating of loose ions, so to speak, is formed over the surface of the plate. A certain number of these ions go into the acid until the acid becomes saturated.

When an external circuit is completed, the formation of ions on the plate is very rapid. They immediately go into the solution to neutralize with the negative ions and give up their electric charge, the current flowing out through the positive or copper plate, through the external circuit, and returning to the negative plate. These ions are peculiar things—they never leave home unless they have a way to return. In other

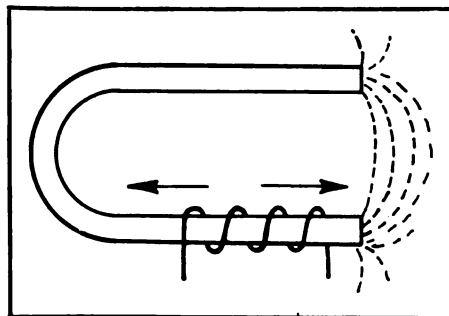


Fig. 2. Magnetic Lines of Force Cut by Conductor.

words, there must be a complete circuit before they will start to work.

The life of a chemical producer depends greatly upon the kind of metal used and the acid. The negative plate in time will be completely eaten away and the compound so formed will be deposited upon the positive plate. The ordinary dry cell is a typical form of chemical producer of electricity by chemical means. In this cell the sal ammoniac acid is thickened by a powder and thus prevents it from spilling. This is why it is called a dry cell.

A storage battery should never be classified as a chemical producer, as the plates do not give up their energy in order to produce a flow of electricity. Every storage battery must be charged by a generator before it can give off an electric current. In other words, the ions are placed on the plate by the flow of the electric current.

The method of producing electricity by mechanical means is quite different. In order to do this, magnetic lines of force must be cut by a conductor as shown in Fig. 2. We must have three things present in order to produce electricity by mechanical means. These are magnetic lines of force, a conductor, and motion. If the coil is moved to the right, the current will

flow in a certain direction. If it is moved to the left, it will flow in the opposite direction.

In the article in the April issue, the principle of magnetic lines of force produced from current flowing around the core was taken up. Now let us refer to Fig. 3. As the magnetic lines of force in this generator are flowing from the north pole to the south pole, when the loops of wire start to enter this field, the lines of force will be rather distorted; in other words, they will have a tendency to drive themselves around the wire similar to water in a whirlpool.

Note that the lines of force are twisted around the wire nearest the north pole in a clockwise direction, and that they are twisted around the wire nearest the south pole in an anti-clockwise direction. When magnetic lines of force flow around a conductor in this method, they produce or induce a current in the conductor. The current in one side of the loop is flowing in the opposite direction from that of the other but, as the loops are connected together, they come out at the end of the loop nearest the south pole. Each end of this loop is connected to a commutator bar. The brush, A, is the positive brush and the brush, B, is the negative brush.

Let us turn the loop one-half revolution. The commutator bars are now bearing

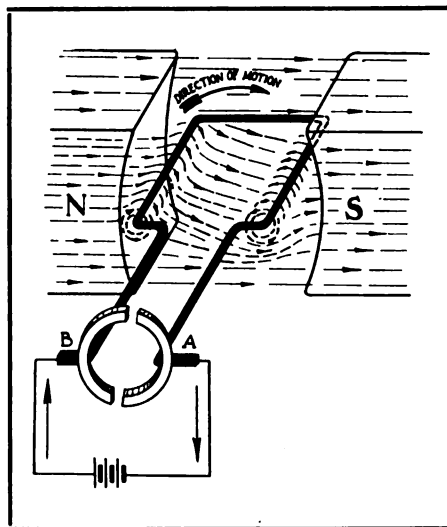


Fig. 3. Principle of the Generator.

on different brushes, but the loops of wire are being cut by opposite lines of force and the current coming out of the armature or loop will be at the same brush. This diagram merely illustrates the principle of a generator. Generators used for commer-

cial purposes have a number of coils or loops, each loop consisting of a large number of turns of wire. Fig. 4 is a sectional view of a commercial armature.

Now it stands to reason if we have more coils in the armature, we will be able to

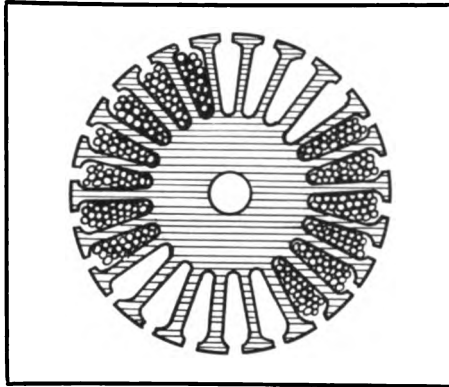


Fig. 4. Sectional View of Commercial Armature.

cut more lines of force per revolution. If more lines of force are cut per second, a greater amount of current will be induced in the coils. If we increase the speed of the armature, a greater amount of current and greater pressure will also be induced. It can then be stated that the number of lines of force cut per second determines the amount of current induced in the coils.

For high voltage induction, the wire is smaller and the number of turns are greater; whereas, for low voltage induction, the wires are larger and the number of turns fewer.

Every automobile must have an ignition system. The battery form of ignition has been the most popular for several years. The initial expense of a battery system is not as great as that of a magneto and, when the fact that a battery must be used to operate the starter and supply the lights with current is taken into consideration, and that a generator must be used to keep the battery charged, it is evident that, in the majority of cases, to carry an additional electrical supply in the form of a magneto would be a rather unnecessary expense.

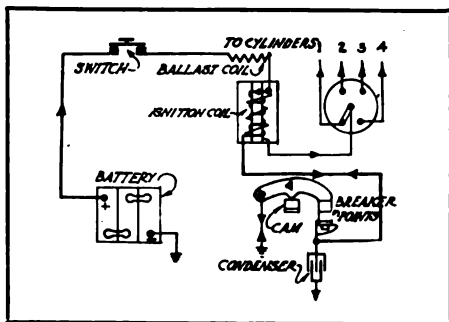


Fig. 5. Simple Battery Ignition System.

The magneto, as we will take up later on, has an excellent field in which to operate—a field in which it will not duplicate other producers of electric current.

An ignition system consists of a source

of current supply such as the battery or generator, an ignition switch, an induction coil, a breaker unit, and a distributor. Let us look into the induction coil and see just what it consists of and how it operates.

In the first place, we must have an induction coil to step up the voltage of the battery to a point where it will be strong enough to jump the gap of the spark-plug. It requires about 33,000 volts to jump a gap one inch wide under atmospheric pressure; that is, if the points are in the open air. If, however, this gap is placed in the cylinder under compression, the voltage must be considerably greater to jump the gap. If the pressure is increased to two atmospheres or roughly speaking, 30 pounds to the square inch, the voltage must then be 66,000.

The voltage required to jump the ordinary spark-plug gap is proportional to the gap one inch wide. The usual width is 1/32-inch and the pressure about five times atmospheric. Therefore, the voltage required would be equivalent to 5/32-inch under atmospheric conditions or 5/32 times 33,000 or 5,150 volts. This is a sort of minimum, as we must have sufficient leeway in the density of the spark to allow for any extremely high compressions, such as are encountered when the motor is hot or pulling in high gear with throttle wide open. In fact, the voltage often runs as high as 18,000 volts at the spark-plug gaps.

Now let us look at Fig. 5, which is a simple battery ignition system. In the article published in the April issue of the AMERICAN GARAGE & AUTO DEALER we found that, when a coil of wire is wrapped around a bundle of soft iron wires and current allowed to flow through them, a magnetic field is produced in the core. If we will now place a number of turns of fine wire over this primary winding, we will have an induction coil.

If the circuit through the primary winding is complete and then interrupted, the sudden decreasing of the magnetic field will induce a current in the secondary winding. The magnetic lines of force will be flowing from one end of the core through the air to the other. They will also be flowing through the secondary wires or turns in the primary. When they pass through the secondary wires, they induce a current in them in a method similar to that in the generator. If the primary winding consists of 100 turns of heavy wire and the secondary has 10,000 turns of very fine wire, the voltage of the secondary current will be 1,000 times as great as the voltage of the primary. This is the principle on which all induction coils operate.

The resistance at the spark-plug gap also determines the voltage that will be induced before the spark jumps. If the compression

is high, the voltage will be much greater.

The amperage in the secondary current will be 0.001 part of the amperage in the primary current. If, for instance, there were 10 amperes flowing in the primary and the ratio of windings is as just stated, the amperage in the secondary will be $10 \div 1,000$ or 0.01 of an ampere.

Example: A certain ignition coil allows a current of 10 amperes to flow from a 6-volt battery. There are 50 turns in the primary winding and 50,000 in the secondary winding. How many volts and amperes are theoretically induced in the secondary winding?

Solution: As there are 1,000 times as many turns in the secondary winding, the voltage of the secondary will be 1,000 times 6 or 6,000 volts. As there are 10 amperes flowing through the primary winding, the amperage of the secondary winding will be $10 \div 1,000$ or 0.01 ampere. The watts,

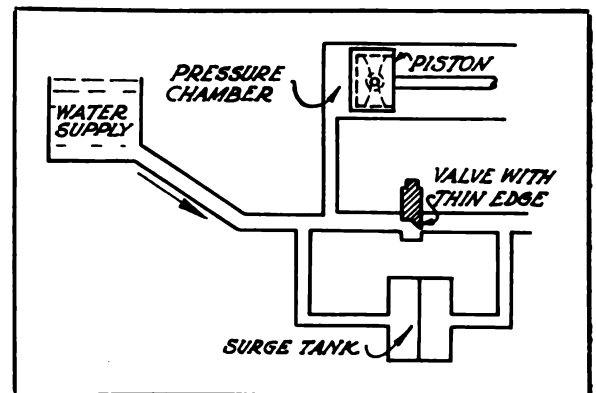


Fig. 6. Place Surge Tank Around Valve.

which are the product of the amperes times volts, in both the primary and secondary, will be the same—barring, of course, the small inefficiency of the coil.

The next unit that we must consider in this ignition system is the condenser. You are all familiar with the "water hammer" that occurs in the water supply system when the water is quickly turned off. It produces a sharp knock which, if strong enough, will burst the pipe. This knock is caused by the momentum of the water. When it is suddenly cut off, the pressure is so great that the knock is the result.

When an electric circuit is opened, there is also a momentum of electricity and this momentum tries to keep the electricity moving in the same path. If we were to place a valve in the water pipe with a thin edge similar to that shown in Fig 6 and closed this valve quickly, it can readily be seen that the thin edge would be turned up.

In order to prevent this, let us place a surge tank around the valve, as in Fig. 6. Now when the valve is quickly shut off, the water from the supply tank will strike the diaphragm in the center of the surge tank and, if the diaphragm is elastic, it will have a tendency to slow up the movement of the water gradually, thus preventing the thin edge of the valve from being curled back.

(Concluded on page 30.)

Finding and Repairing Tire Damage

Tire Man Must Be Able to Determine Causes of Tire Injury as Well as Turn Out Good Repairwork — Suggested Methods of Tire Inspection — Table Showing Load Recommended for Each Wheel Equipped with Certain Size Tire

By H. J. White and Lowell R. Butcher

Instructors in Automobile Trade School, Des Moines University

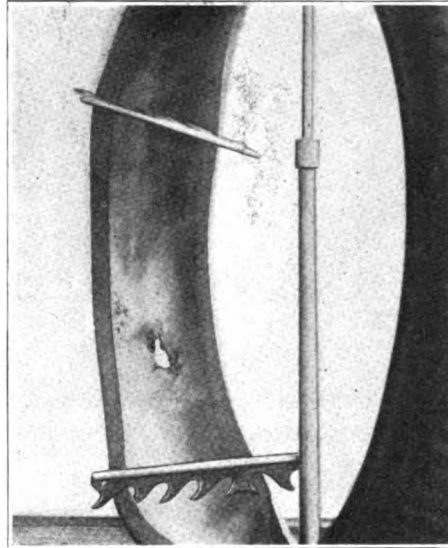
A tire man must not only be able to turn out good repair work, but he must also be able to determine the cause of the tire injury. Service has to be sold—exactly the same as any other commodity—and in order to sell tire service, one must understand all phases of the work.

A workman who is able to intelligently inspect a tire can give to his patrons all the information and advice necessary on the proper care of tires. Such a service as this is bound to bring business—motorists will patronize a man who is able to detect the cause of an injury and will depend upon his recommendations as to repairs.

Tire inspection should be gone about systematically. Hit-and-miss methods of inspection will not do. Some order must be followed to insure that the examination is thorough.

The inspection may be accomplished best by starting at the inside of the tire. Open and spread the tire so that the inside may be plainly seen and felt. Next, and especially in the case of clincher-type tires, flex or bend the tire just above the bead channel. Now bend the tread surface, opening all tread cuts, and examine the side wall thoroughly. By placing one thumb at the center of the tread and the other at the union of the tread and side wall and forcing them together, the tire will be flexed at

spection will bring to light any places where the fabric is cracked or chafed, although these last two injuries often escape detection if the inspection is careless. The inside of a tire is covered with a thin layer of



Chafed Fabric and Resultant Blowout.

friction (rubber) and tire paint. Cracks in the fabric, if small, may be concealed by this covering. A good light is essential when examining for these injuries.

Between each layer or ply of the fabric, and surrounding each cord, is a thin layer or coating of friction material. If the fabric becomes separated this material will peel and form tiny rolls between the layers of the carcass. Separated plies may be found by developing the sense of touch to such a degree that these rolls of friction may be felt when inspecting the inside of a tire. Separated plies cause a constant rubbing or friction between the plies of a tire and will eventually cause a blowout.

By flexing the side wall just above the channel of the bead, rim cuts are opened and plainly shown. The rim cut on the clincher type of tire is close to the channel of the bead and may pass unnoticed unless a careful examination is made. When inspecting for rim cuts, check the condition of the bead. Frayed or broken beads are easily found.

Bending or flexing the tread discloses all tread cuts. A small cut cannot be neglected without harmful effects. Dust, sand and moisture penetrate into and destroy the carcass. This foreign matter destroys the adhesion, rots the fabric and causes blowouts. In many cases these cuts will extend into

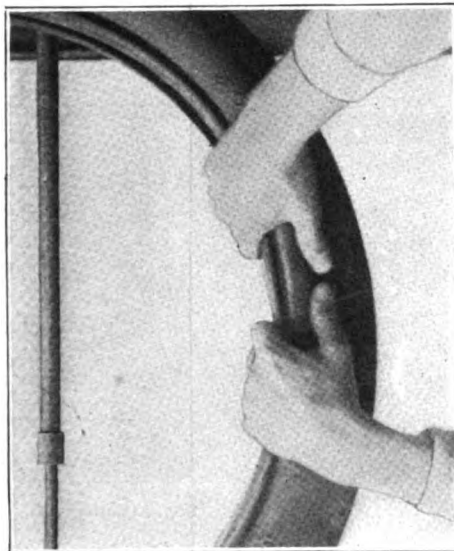
the carcass, sometimes severing one or more layers.

Pressing the tire between the thumbs, as explained, will detect any tread separation of the outer plies or tread. Any tread separation is usually found in the "hinge" section of the tire, or that part of the tire between the tread and side wall. If there is tread separation, moisture and dirt will work in through any small tread cuts and pass down under the hinge section. There it will form mud balls with a consequent rotting of the fabric.

General inspection of the outside of a tire may disclose injured side walls, worn treads, fender cuts and many other indications of abuse and wear.

The most common injuries that the repairman will encounter are side wall cuts, rut wear, stone bruises, chafed and cracked fabric, separated plies of fabric or loose cords, rim cuts, tread cuts, loose treads, prematurely worn treads and fender cuts. Each of these ailments has a direct cause and is, in many cases, the result of abuse rather than normal wear.

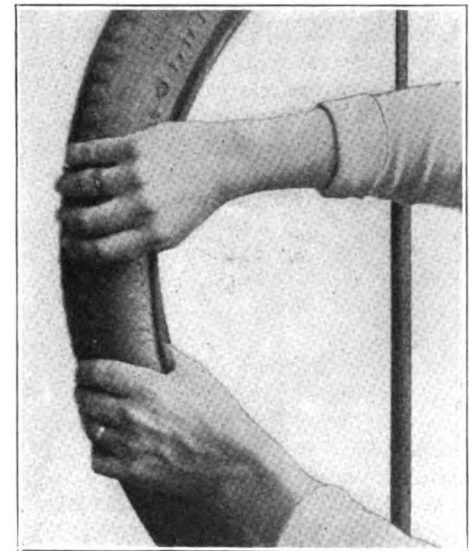
Stone bruises, or bruised blowouts, are the results of striking or coming into contact with sharp objects such as stones, running or backing against curbs, or jamming against a curb when rounding a corner at a high rate of speed. Such abuse of tires causes



Inspecting for Rim Cuts.

the point at which tread separation is usually found.

The inside inspection will locate most of the injuries to the carcass. If the tire is spread wide open, bruised blowouts and stone bruises may easily be found. This in-



Inspection for Tread Cuts.

the fabric to stretch beyond its elastic limit and break. A blowout may not occur at once, due to the fact that the break in the fabric may be small enough to avoid pinching the tube for a time. Again, the tread may be in good condition and able to with-

stand the pressure. In any case, a blowout will result if the fabric break is not repaired as soon as possible.

It must be remembered that an underinflated tire is more subject to stone bruises or bruised blowouts than one that is properly inflated. The stretching of the fabric takes place much more easily if the tire is soft.

It is very difficult to distinguish a chafed fabric injury from that of a cracked fabric. Generally, chafed fabric is caused by running with an unvulcanized blowout boot or an underinflated tire. Underinflation will cause the tube to chafe and especially is this true in the case of a cord tire.

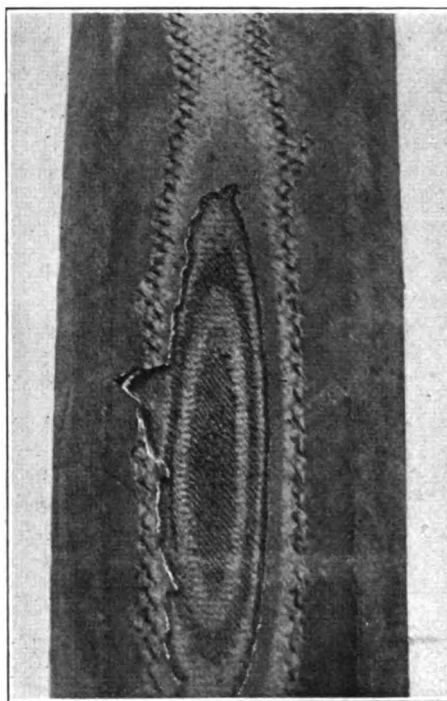
Unvulcanized blowout boots are intended only for temporary or emergency repairs and should not be used except for such repairs. A boot of this sort invites chafed fabric injuries and allows dirt and moisture to work into the carcass of the tire, with consequent injury. A properly vulcanized blowout boot eliminates any danger of chafing or injury to the tube. If the tire is worth repairing it should be repaired at once.

While cracked fabric is caused by running a tire which is underinflated or carrying an overload, it is quite natural that the motorist, unless warned, will run his tires in this condition. A car rides much easier with soft tires, but it is a comfort that is costly. Every manufacturer of tires has a recommendation as to the maximum load to be carried and a specific air pressure for each size of tire. Such recommendations should be strictly adhered to. There is little danger of overinflation—popular supposition to the contrary. Almost any standard make of tire will hold at least three times the amount recommended.

The bending or flexing motion given to a tire that is run soft will often cause the fabric or cords to separate. Cord tires are particularly susceptible to this injury, and a good cord tire may be ruined by running

distance about the tire, it is a useless and poor policy to try to repair. Slight separation may be treated successfully.

Practically all rim cuts can be traced to underinflation or overloading. The tire folds



Excessive Wear Caused by Misalignment.

down against the sharp edges of the rim, cutting the side wall and breaking the fabric. The shape of the clincher rim makes this a common injury to this type of tire. Rusty rims, bent rims and misapplied rims will cause the same ailment. Swinging the weight of the car onto one side of the tire by turning corners too fast has the same effect as underinflation or overload. Time lost by taking corners at a reasonable rate of speed will be more than paid for in increased mileage.

Broken beads are the result of the careless application of the tire, or serious blows encountered when rounding a corner too fast.

Punctures and tread cuts result from passing over nails, glass cans, stones or sharp objects that cut or penetrate the tire. Many of this class of injuries are unavoidable, but careless drivers will not often take the trouble to turn out of the track when these are encountered. Neglect of these small injuries shortens the life of the tire and invites blowouts.

Separation of the tread and plies may be the result of overloading or running on tires that are not properly inflated. Tread cuts—allowing sand and moisture to enter and loosen the tread—may be a cause.

A tread of a tire is designed to last the life of the carcass. When treads wear out prematurely, it is safe to assume that the undue wear is due to abuse. A wheel out of alignment, a bent axle, a wobbly wheel, a grabbing clutch or set of brakes, spinning of the wheels, skidding, underinflation or

overloading, fender cuts, misapplied chains, running on car tracks—all of these contribute to premature tread wear.

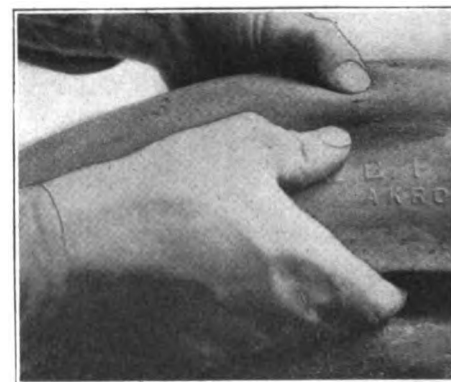
If a wheel is out of alignment, the tread is usually worn down around its entire circumference. A sharp edge at one side of the tire will be left, giving the appearance to the tread of being ground off at an angle. A wobbly or sprung wheel will cause the tire to be worn down in spots. The uneven wear caused by a bent axle resembles that caused by a wobbly wheel. Tires worn in this way are usually taken from front wheels although a wobbly wheel or a sprung wheel is possible in the rear pair of wheels.

A car suddenly stopped by locking the brakes or jerked into a start by a grabbing clutch, will cause the tread to be ground off in one place. A bad skid on a rough pavement will cause the same injury.

Misapplied tire chains will soon ruin an otherwise serviceable tire. If a chain is properly fitted to the tire and used only when needed, it will not seriously injure the tire. Tire chains should always be loose enough to creep, so that any wear is evenly distributed about the tire. Under no circumstances should chains be used unless absolutely necessary. Especially is their use on pavements injurious, as the tire is indented every time it passes over a cross chain.

Chains should always be applied with the same side next to the tire. Road wear causes the links of the cross chains to become sharp and, if the road side is placed next to the tire, it will cause excessive wear. Cheap chains, which wear quickly, or badly worn chains will prove very expensive to the driver who uses them.

A bent fender which drags on the tire will cut and chafe it. Often this drag is unnoticed, for the fender may clear the tire when the car is not loaded or may only touch the tire when a corner is turned.

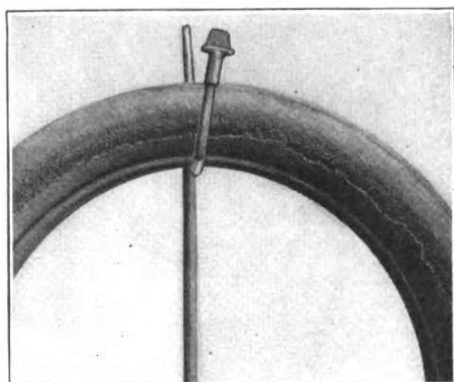


Detecting Tread Separations.

Bolts and screws that drag on the tire will cause the same trouble.

A tire which is badly worn on each side is usually the result of driving in street-car tracks or in ruts. The wear will be very noticeable on each side where the tire comes into contact with the sharp corners. Care-

(Concluded on page 42.)



Due to Driving in Street Car Tracks or Ruts.

it a few miles when soft or flat. The cushion receives punishing abuse and soon wears out or breaks. Road shocks are then taken directly by the carcass. A tire injured in this way becomes soft and—in repairshop terms—is spoken of as having a "broken back." If the separation continues for any

Welding, Cutting and Brazing Practice

Don't Overlook Importance of Welders' Supplies When Establishing Your Oxy-Acetylene Welding Shop—Filler Metals and Filler Rods—Welder Should Always Have Supply of Welding Fluxes—Other Essential Supplies

By David Baxter

Almost equal in importance to the equipment and tools of an oxy-acetylene welding shop is the matter of welders' supplies. It is one item that should not be overlooked in the establishment of a new welding venture. In fact, it is of such vital importance that it might be said that good welds cannot be made without good supplies—although many welders still persist in turning out poor work with the best of supplies and equipment.

In previous articles we have dealt with the various pieces of welding-shop equipment which are absolutely essential to the welfare of the repair business in general, insofar as it concerns the work of the oxy-acetylene flame. Therefore, it should not be inappropriate to take up the matter of welders' supplies and accessories before going further into the technique of the torchman's craft. In fact, the beginner will find it as advantageous to know something about the little things as to understand the principles of his torch and gas supply.

Take the item of filler metal, so called because it is used to fill in between the broken parts of a welding job. This material is manufactured in the form of rods and wires approximately two feet long, of a diameter varying according to the thickness of the parts to be welded. These rods are usually square, round or hexagonal in shape and made of different kinds of metal, to suit the nature of the metal to be welded. However, there are instances where it is essential and even compulsory, to employ a different filler metal than the metal of which the job is composed.

These filler rods run from a wire 1-16 inch in diameter up. But the garage welder is seldom called upon to use a rod which is over 3/8-inch in diameter. The diameter is selected according to the thickness of the metal through which the weld is to be made. This is not arbitrary, as it has some range either way.

In other words, a smaller or larger filler can be used on the same weld by a clever manipulation of the torch and the rod itself. This is not recommended as good practice and should be employed only when the operator knows his business. It is better to follow the manufacturer's tables of instruction as nearly as possible.

In the welding shop there should be racks or bins for keeping separate the various kinds of filler metal—especially the high-priced special steel rods or those of specified bronze. Each compartment should be so marked as to enable the operator to tell at a glance exactly what filler metal he is

using. A simple storage system also notifies the welder when his stock is running low.

The racks should be arranged where there is a minimum of rust, dust, grease or other like substances—particularly if the rods are bought several months ahead. The adherence of foreign substances—such as



Some Filler Rods for Special Purposes.

rust or grease—has an adverse effect on the weld. Some of it may be absorbed by the melting metal which will cause a porous or brittle weld.

In truth, it is a good idea to clean every rod before using, for although it may be new stock it is liable to have quantities of burned molding sand adhering to it. This should all be scraped off before applying the filler to the weld. Cleanliness is always essential on any kind of metal, whether cast or drawn rods.

When purchasing his filler supplies the welder will do well to deal mainly with concerns making a specialty of this class of material, since there is often a wide variation in the quality of the same kinds of metal. As there are but few physical tests by which the welder may know the quality, he must trust to a great extent to the word of his dealer.

The welder is usually somewhat at the mercy of the manufacturer until he learns to judge the nature of the metal by

experience as to its appearance in the fracture. Of course, he may purchase the best of metal and then spoil it by the way he handles the welding flame.

Now, the length of the filler rod is somewhat immaterial, since the torch operator can easily weld several pieces together to make the desired length. In fact, the careful welder will never throw away any scraps or short pieces of welding rod, and thus he can eliminate much waste.

It has long been quite a common belief that the bar of metal is a straight rod of specified diameter. This is a mistaken idea, since the nature of the job to be welded is often such that a straight filler rod cannot be used with any great success. In fact, it is often absolutely necessary to use a curved or angled rod—such as when welding in close quarters, behind transverse sections, or in deep pockets of heavy castings.

If the rods are of mild steel, wrought iron, or bronze, it is a simple process to bend and rebend them to the desired curve or angle. If the rods are made of cast metal—such as iron—the desired shape may be attained by welding short pieces together at the end of a handle section. For such work as scored cylinder welding, automobile parts welded "in place," or overhead welding, the torch operator may often obtain better results by constructing a special-shaped filler rod, as suggested above.

When filling in missing areas of crankcases, cylinder blocks, etc., the clever welder can weld a short piece of heavy filler to a long handle-like piece of lighter rod. With this handle, he can hold the stub in place until it is melted and spread out over part of the hole. Then melt it loose from the handle to stick another piece on in its place.

Several special-angle filler rods are shown in one of the illustrations, as are also the racks for the stock supply of filler. It will be noted that two of these rods are bent directly back toward the torch operator's end. This idea was used on a cracked pipe, where the operator could not reach the fracture when using a straight rod.

Now, let us endeavor to understand some of the non-technical characteristics of several different kinds of filler metal, in order that the novice may get an idea of what to expect as she progresses in the art of welding.

We shall first consider what is probably the commonest kind—cast iron. The welder will, no doubt, find that the harder grades shrink more, and faster, than the

soft grades. Or this might be paraphrased: The better grades do not contract as badly as the poor grades. In other words, the job is more liable to crack back if a hard quality of cast-iron filler is used. On top of this, hard cast-iron filler makes a weld which is difficult to machine if not impossible. If such filler is applied where the weld cannot be ground with an emery grinder, the work will be for nothing since the ordinary machine tool will not touch it.

Another peculiarity of cast iron is that when remelted it becomes a degree harder. So a fairly soft filler may be quite hard when melted into the weld. This is sometimes due to the flame manipulation, but is more often due to the fact that the filler was not soft enough at the start. Small diameter rods are more likely to be hard than the larger sizes, due to the chilling effect of the mold into which they were cast.

The very hard grades are readily known by the whitish, poreless or glossy surface of the fracture. A naturally hard cast-iron filler must be melted very carefully, else it will almost double in hardness. If too large a flame is employed the metal will harden through oxidizing. A fairly soft grade will be so hard it is difficult to dress after the weld is finished. If the rods are as soft as they should be the flame must be handled correctly to keep the weld soft enough to machine.

About the only place a hard, cast-iron filler has in the welder's craft is for filling

Each re-melting lowers its value, although it cannot be said to harden each time. However, the welder should not take for granted that all cast-aluminum filler rods are alike, simply because they have several qualities which are the same as iron.

Other metals are mixed with aluminum at the factory to give it casting ability, and some are added to cheapen the product. Zinc and copper are probably the controlling features so far as the welder is concerned. A cheap grade contains a large percentage of zinc, which metal has such a low melting point that it oxidizes or burns very easily. If attacked too ardently with the welding flame, the zinc will all burn out of the aluminum and thereby fill the whole mass with oxide.

On the other hand, the copper content has a melting point which is so much higher that the novice is often puzzled by the action of the aluminum when it melts—especially if, unknown to him, it contains a large percentage of copper.

The best grades of aluminum filler oxidize quite readily—even when it is merely exposed to the atmosphere for a protracted period. This means that an excessive stock should not be kept on hand in the small shop—particularly if the storage racks are exposed to moist currents of air. The tarnished appearance foretells the state of oxidation.

Oxide of aluminum is the welder's worst enemy when welding this kind of metal. Each rod ought to be cleaned before using, to remove the surface oxide, or corrosion as it is commonly known. Part of this may be the fault of careless melting at the factory where the rods are cast. It is, therefore, in the heart of the rod, where no amount of scraping or other cleaning will do any good.

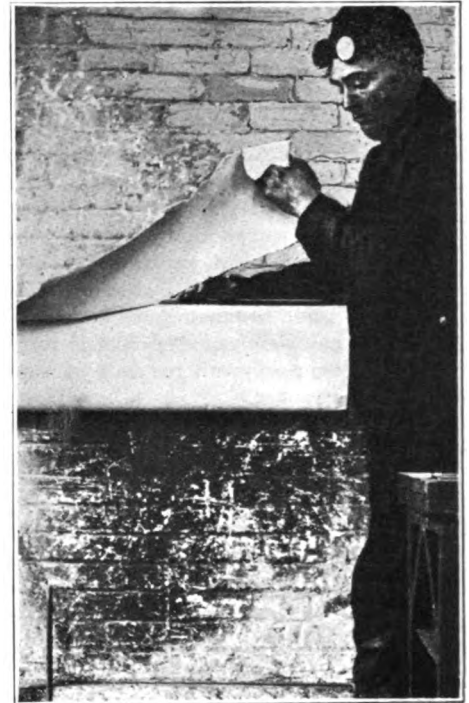
But, after all, the welder should know that his flame is right and that his manipulating is correctly attended before censuring the aluminum-filler manufacturer, as the flame will ruin the best grades very quickly if not correct.

A larger stock of bronze and brass rods may be kept on hand, but these, too, must be melted correctly—particularly if they are a special brand and made up for certain purposes. They oxidize quite easily and, therefore, require a deft manipulation of the welding flame. Bronze is often used for repairing steel and is always used on malleable castings, so the automobile welder should be acquainted with its peculiarities.

The so-called "Norway iron," mild steel and special steel rods are some of the necessary supplies which the welder should always have on hand. The latter class is nearly always for specific purposes, so we will not attempt to go into details in regard to the brands to buy.

The other two are frequently used in all general workshops. They are practically the same and, as some of the largest manufacturers in the country are now special-

izing in filler rods, the welder is fairly safe in purchasing by analysis. This is one class of filler rod of which the welder should have a variety of sizes on hand. The smaller diameter is for body, fender and other



Keeping Asbestos Paper Suspended From Hanger on Wall Prevents Wastage.

sheet-metal work. The heavy sizes are for axles, shafts and castings.

In connection with his filler stock, the welder should always have a supply of welding fluxes. Nearly all of the metal parts of a car require the use of flux when they are welded. Practically all except steel and wrought iron need to be fluxed when melted.

The welder should buy a supply of flux made especially for aluminum welding, another for brazing, and still another for cast-iron work. There are several good brands of each on the market. However, many operators prefer to mix their own and they should know the ingredients and be prepared to mix them in correct proportions.

Still another almost indispensable article in the welding shop is asbestos paper. This material finds so many useful purposes that it is not to be left off the list of welding supplies. It is used to cover such jobs as cylinder blocks and crankcases during the preheating and welding processes. Also to promote slow cooling when the weld is completed.

It is used to protect the welder from the discomfort of a long job; for the purpose of making pads to lift hot castings; to insulate the job and prevent loss of heat through conduction, and to protect the metal of polished surfaces, such as the bore of an automobile engine cylinder, from direct contact with the preheating flames.

Even after it becomes shattered, the sheet
(Concluded on page 30.)



Know Correct Proportions of Each Ingredient When Mixing Your Own Flux.

holes or building on where no dressing is required.

In many ways, cast-aluminum rods are similar to iron. They have about the same rate of contraction and cool about the same.

Finding Profits in Your Storeroom

Purpose of Storeroom to Provide for Orderly Location of Parts—Is Connecting Link Between Office and Repairshop and One of Most Important Branches of Dealer's Business Activities—Some Practical Storage Cases

By Gustav H. Radebaugh

The purpose of a storeroom is to provide for the orderly location of parts—to assist in ordering, locating the parts and keeping a record of them and to insure the parts from loss. The storeroom is the connecting link between the office and repairshop and, from a financial angle, is one of the most important branches of the dealer's business activities.

Investigation will show definite standards established in storeroom management, and every operator of a service station should familiarize himself with these practices that have for so many years given excellent results in our older established industries.

The small dealer may feel that there is no place in his business for the storeroom. Probably not, but certainly if stock and repair parts are handled there should be a method of control which maintains records of sales and orders. If the purpose of a storeroom is to provide storage for stock, which insures the parts from loss, it may be permissible to call the showcase or cupboard located in the office a storeroom.

Just so long as the principles of stock control are used, it does not make any difference whether the storage is in small or large storage units. I have seen excellent control of stores and stock, in a small station, handled entirely from showcases and wall cupboards. It is appreciated that, if large amounts of stores are to be carried, it is best to establish in the station a separate room for their storage.

The office should have direct control over the storeroom. Here an inventory of parts should be kept, all material and supplies ordered and invoices issued. In other words, a general supervision of all details pertaining to the proper control of stock handling in the storeroom should come from this center.

Notice the many influences surrounding the average storeroom of a dealer carrying five accounts, as illustrated in Fig. 1. If a dealer is carrying five sales accounts, as shown by this graphical layout, the repair parts controlled by the storeroom should be carried in separate accounts. This will permit better storage of the stock and a much closer check on the business done on each account. No articles of stock or supplies are issued without making the proper charges. The storeroom should be designed to serve the repairshop, the customer direct and service work.

The arrangement of the storeroom should be made to facilitate free passage between storage cases. The natural lighting of the storage cases should be considered. In ar-

ranging storage bins it is best to plan to place the storage of bulky stock to the rear. All the smaller stock and supplies that are most frequently used should be placed close to the issuing window.

In Fig. 2 the room is closed off and a window with a counter is provided for shop usage, a counter or showcase being provided for selling direct to the customer. One of the first essentials in controlling stores effectively is to prohibit the entry to the storeroom of anyone excepting the store clerk.

This may seem unreasonable, but compare the problem to the retail store. If everyone were allowed to go back of the counter to make his own personal selection, what would be the condition of the stock in a very few days?

The storeroom in the service station is indeed a store—it is the dealer's store and should be visited and respected by the trade the same as any retail store. Too often customers and shop men take advantage of slack methods and become careless as to charges on stores removed. This means a direct loss.

The clerk who is placed in charge should be, if possible, a man having stores experience. Many times men are placed in charge

of the storeroom who do not appreciate the importance of proper records. Somehow they do not realize that the stock they are handling represents cash. They are indifferent and careless about the execution of the instructions given to them by their working adviser.

To assist in keeping up with the latest improvements in the lines carried, several trade papers should always be found in the storeroom.

One of the most effective means of keeping track of new equipment and accessories is for the clerk to keep a clipping file. All advertising of interest can be clipped and filed for reference. Later, if there is a sales demand, the store clerk can review the advertising and place the order.

The visits of salesmen to the storeroom should be encouraged. Salesmen acquaintanceship is worth while, and the office should make it possible for the storeroom clerk to meet every salesman that calls who handles a line of interest. This will enlarge the clerk's sales ability and stimulates in him a force to sell goods.

All gasoline, oils, greases, tires, accessories and shop supplies—such as files, valve-grinding compound, waste, etc.—should be sold or issued through the store-

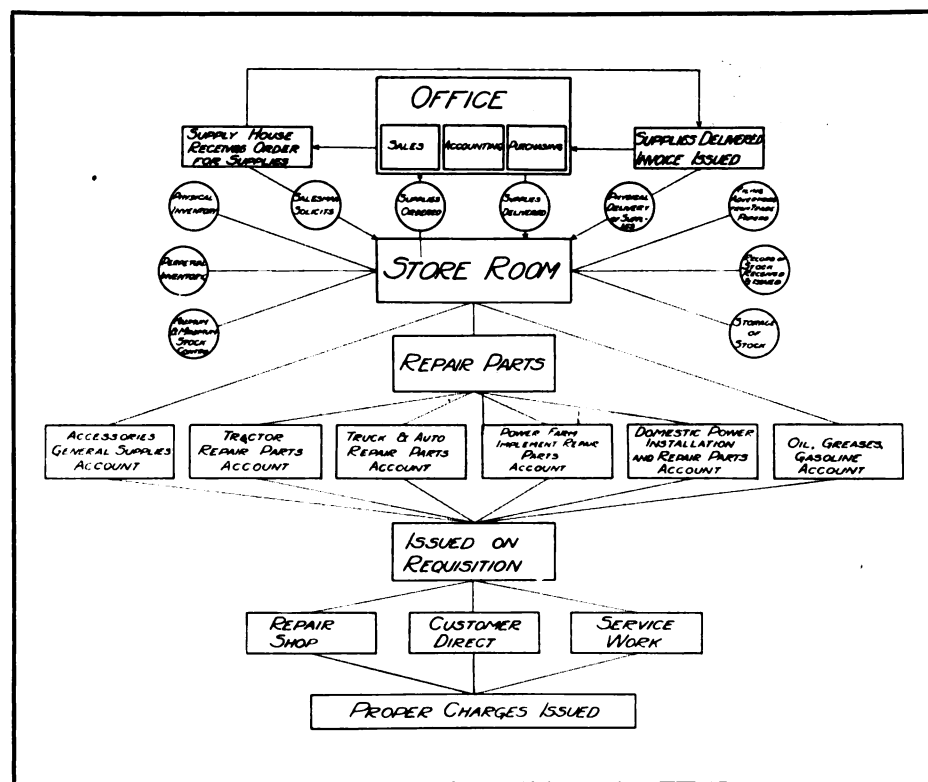


Fig. 1. Graph Defining Storeroom Activities.

room. This centralization guarantees a more accurate control. It also decreases the cost of handling these supplies. By placing the responsibility for the sale of all these items in the hands of one person it is obvious that a much keener supervision

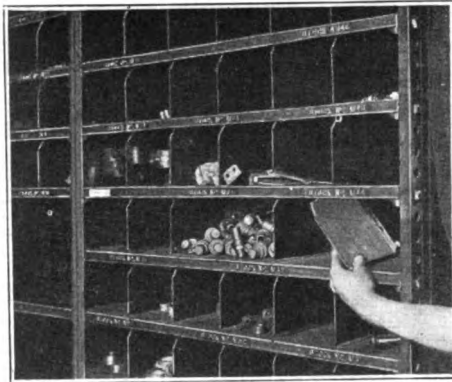


Fig. 3. Removable Partitions for Easy Adjustments.

of stores can be maintained and a decidedly closer relation to the trade is made possible.

One of the most important items of storeroom control is to know what stock you have in the storeroom and where it can be found. Oftentimes, parts and supplies are laid away never to be found when you want them, but later to show up to the amazement of everyone concerned. Conditions like this should be forcibly attacked and improvements made which will eliminate all guesswork when questions come up as to stock on hand.

To do this, proper storage cases should be provided. The best and most effective storage case for repair parts and general supplies is made from steel. These cases

are manufactured and are advertised as standard equipment. They can be purchased in convenient sizes. The pockets or bins can be ordered to suit the size and arrangement desired.

With a wide aisle and good lighting arrangement, proper care can be given to the stock stored in these cases. The double-bin method of keeping track of stock is sometimes used where it would be impractical to use other more complete methods of stock control.

In this plan two bins are used for the storage of one style of parts. In one bin are located the parts inventoried, and in the other bin the parts to be issued. These have been removed from the first bin and a charge made on the records which, when deducted from parts in the bin, show what stock is on hand.

The stock record will always show how many items are in bin No. 1. The only advantage of this scheme is to make it possible to know what supplies are on hand. This plan is used in handling washers, nails, nuts and, in fact, any items that are small and constantly in demand.

These steel cases can be arranged for the two-bin method of stock control. The great disadvantage of this scheme, however, is the amount of excess storage space used. A much more effective storage plan is the perpetual inventory scheme where only one bin is used. Steel cases can be easily adjusted to bin sizes after the case has been assembled. In Fig. 3 is shown a small partition being slipped into place. These partitions are fastened into position with screws which fasten them to the location desired.

On the front of the bin is fastened a label

holder, making it very convenient to place a symbol or stock number in front of the pocket. Bin numbering is considered the best medium for locating stock. Every pocket or storage bin in a case is numbered with the manufacturer's stock number of the part or some symbol arranged to facilitate quick location of parts.

Symbol numbers for stock identification should be prefixed to the manufacturer's number of the part, as "84T." The 84 represents case (8), section (4) in case, the "T" representing the part number. The location of this part would be extremely simple with this information.

The wooden case, as shown in Fig. 4, makes a very effective method of caring

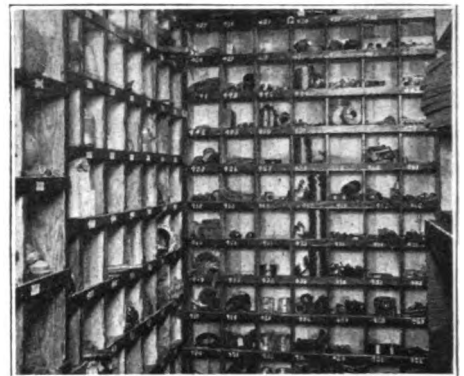


Fig. 4. Wooden Bin Method of Parts Storage.

for small engine-repair parts. This single-face case is designed so that it will fit against the wall. It does not take up any more room than is absolutely necessary for the stock which it contains, the size being 4 ins. to 6 ins. deep, 6 ft. high, 10 ft. long, with pockets ranging in size from 4 ins. by 4 ins. to 9 ins. by 9 ins. It is made from $\frac{5}{8}$ -in. poplar lumber, with nailed joints and rebitted pockets.

The case shown in Fig. 5 exhibits a double-face case with slant fronts. This case is a room-saver. Long and large stock can be stored in the bottom and the smaller parts in the higher pockets. On top of this case miscellaneous supplies can be stored. The size of this case is 6 ft. high, 10 ft. long, with pockets 10 ins. by 6 ins. at the bottom and 4 ins. by 4 ins. at the top.

Men working in the shop must be supplied with small tools and shop supplies with as little delay as possible. In some shops it is the practice to have all small drills, screws, keys, emery cloth, etc., stored in bench drawers in the shop. This makes these items accessible to everyone. No check is kept as to the quantity used and no one is directly responsible.

Often the tools are lost or put away in places other than where they belong, which means a search for them if they are to be used. This condition can be greatly improved by placing a cupboard for small tool storage in the storeroom that is to be directly under the supervision of the shop foreman.

In Fig. 6 is shown a cupboard arranged

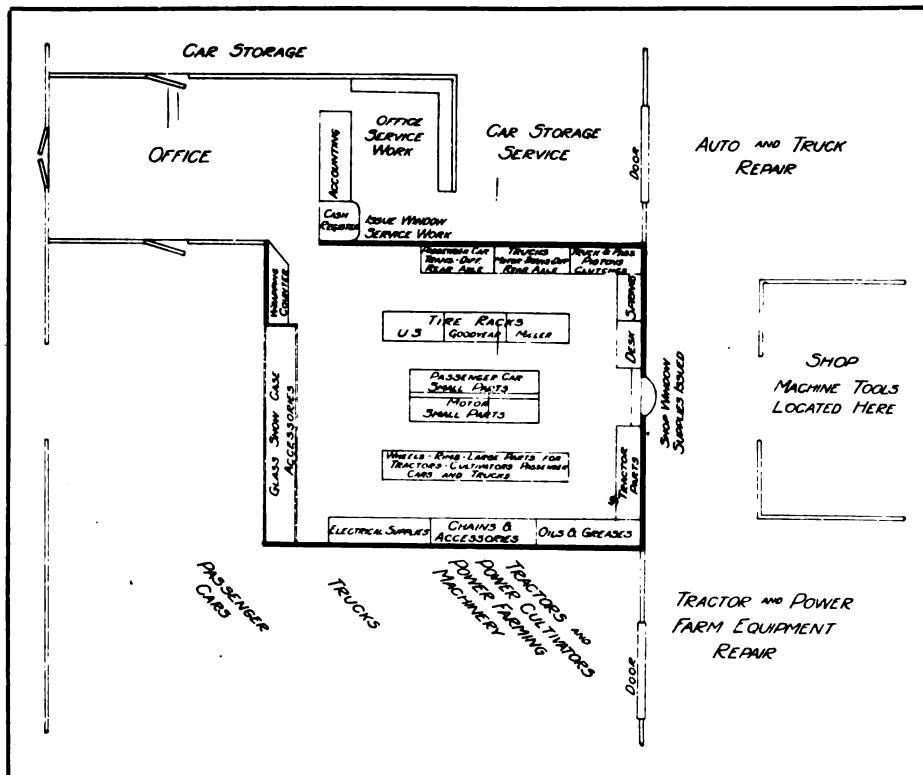


Fig. 2. Suggested Storeroom Floor Plan Shows Storage Bin Arrangement.

for tools and miscellaneous supplies. The storeroom clerk can be of assistance to the foreman in issuing these tools. He can keep a record on just what tools and how many each man receives. When issuing tools to the shop men a very good plan is to issue

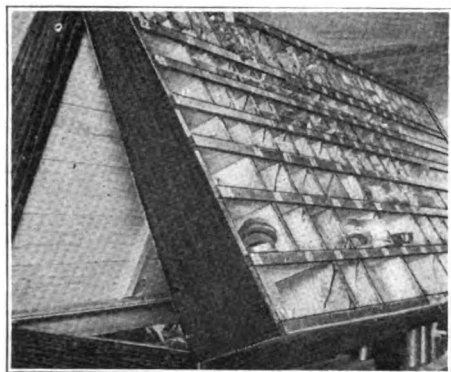


Fig. 6. The Slant Bin Represents Good Storage Practice.

to each workman a set of necessary tools such as hammer, wrenches, files, scrape chisels, etc.

These tools are charged to the workman. If he needs a new file he returns a wornout one for a new one, the same practice being used in connection with issuing other tools. Taps, reamers and chisels that are the more general shop tools can be issued at the discretion of the foreman of the shop. His constant checking of tools will give him the necessary information as to conditions of tools and when new ones should be issued.

To get the most out of the money invested in emery cloth each year, purchase the economy rolls and provide a rack for them, as shown in Fig. 7. The abrasive cloth can be issued to the shop men by the store clerk without an order. The saving in issuing from these rolls is obvious—only enough being secured by the workman to do the job.

If a sheet is issued, a piece is torn from



Fig. 8. This is a Convenient Screw and Key Case.

the sheet about the width of a file and the remainder of the sheet is left on the bench to accumulate grease and dirt. These rolls can be purchased in any desired degrees of grades and grits.

Machine screws, which are so often

needed to replace lost or stripped screws, are not generally found in assortments that will be of benefit to the shop.

They should be carried in flat, fillister and round heads with the old standard and the new A. S. M. E. standard threads.



Fig. 6. Storeroom Tool Cupboard is Placed Under Desk.

To properly store a collection of screws, a case such as that shown in Fig. 8 will be found very serviceable. In this case, as a close inspection of the view will show, taper pins and Woodruff keys of the usual sizes are stored. This type of case can be purchased from any advertised supply house.

In handling screws, to make it convenient to locate the screw of the size desired, a small brass plate with the style of screw and sizes is placed on the front of the drawer, as shown in Fig. 9. In this view the gaging of a machine screw is also shown. This is done by using a drill and a machine-screw gage. These gages are designed to simplify the sizing of screws. By using this gage, many of the sizing difficulties are eliminated.

When using machine screws the diameter or size of the screw, the number of threads per inch, the size drill needed to drill the hole for tapping and the size drill for the body size of the screw are all



Fig. 9. Gaging a Screw and Labeling Drawers.

needed. This is the information that can be secured from the screw and drill gage.

The drills used for drilling tap and body sizes for machine screws are known as number drills—that is, the size is designated by number and not by fraction sizes.

These drills, to be properly stored, should be placed in an open case, as shown in Fig. 10, where it is possible to see just what sizes are in stock. Each pocket holding drills is labeled with the number size of the drill. You will note that in this

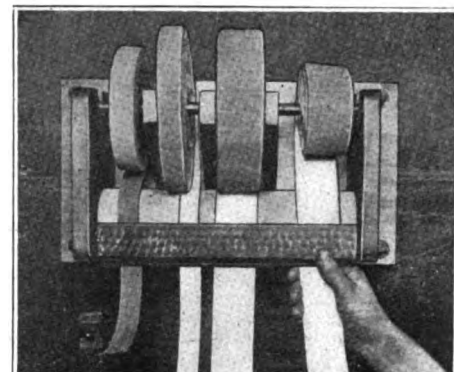


Fig. 7. Rack for the Carborundum or Emery Cloth Roll.

view the drill is being sized with the gage in the same manner as the screw.

(To be continued.)

Colorado Commission on Use of Public Highways by Trucks.

After an investigation of the transportation conditions in Eagle and Garfield counties, the Colorado Public Utilities Commission found that, although there were 68 motor trucks operating as public carriers in these counties, they paid into the state treasury only \$819 per year for use of the state and county highways.

During the same period, the D. & R. G. R. R.—which these buses parallel—paid \$38,023 for public roads which they do not use at all.

The important portion of the decision is: "Public convenience and necessity . . . as contradistinguished from the convenience and necessity of a very small number of persons who seek to derive a profit

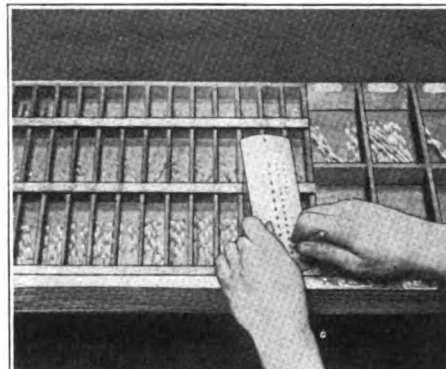


Fig. 10. One Good Way of Taking Care of Small Drills.

from the farmers' and home owners' investment in roads, never contemplated that the truck driver should destroy that, to the cost of construction of which he contributed little or nothing, or that he should reap where he has not sown."

IGNITION COILS AND GENERATORS

(Concluded from page 22.)

The breaker points in the ignition system are the same as the thin-edged valve. The surge tank is the same as the condenser. When the circuit is quickly opened by the points separating, the momentum of the current is absorbed by the condenser thus preventing it from arcing at the breaker points. Continual arcing will burn the points. A white spark will be produced if the condenser is defective—it can be noted by looking at the points while in operation. Under normal conditions, there will be a very small spark.

The condenser also has another function. That is to absorb the eddy currents that would be induced in the primary coil on account of the current flowing in the secondary. These eddy currents may be likened to the circular waves made when a rock is thrown into a pond of water. These waves go out and out and gradually diminish until they disappear entirely.

The magnetic field is built up in a similar manner. If these eddy currents are absorbed instantly, the secondary current produced in the spark coil will be of much higher value. In fact, it would be impossible to operate the ignition system satisfactorily without the use of a condenser. Not only must we have a condenser, but it must be of the proper capacity.

You may undoubtedly have the idea that the secondary winding must be connected to the primary winding, in order to have a current in the secondary at the time the points are opened. This is not the case. The secondary need not have any electrical connection whatsoever with the primary. Some coils are constructed in this method while the majority of them fasten the sec-

ondary to the primary merely for the reason that it eliminates one terminal on the coil.

The primary circuit is then used for the return of the secondary spark after it jumps the spark-plug gap. It will return through the ground, through the breaker points.

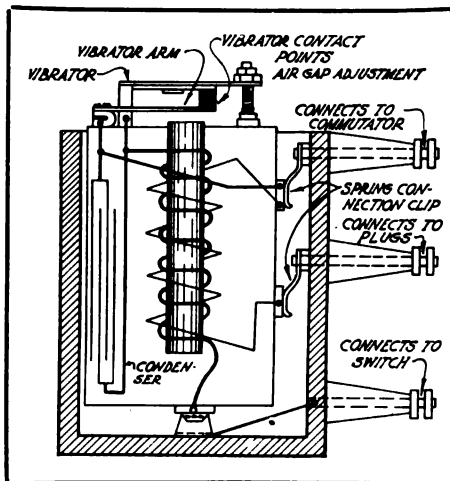


Fig. 7. Sectional View Ford Vibrating Coil.

through the primary winding and back to the other end of the secondary, or it may return from the ground through the battery, the ignition switch and back to the other end of the secondary. The path which it takes, when returning, is determined mainly by the resistance of these circuits.

Keep in mind the fact that electricity always takes the line of least resistance. Naturally, we do not care which path it takes just as long as it has a path to get back. It has done its work after it has jumped the spark-plug gap, and the fact that it returns home through one path or the other will not alter its strength in the least.

In the coil shown in Fig. 5, there is only

one spark produced in each explosion in the engine. In other words, with a 4-cylinder ignition system there will be four sparks per revolution of the breaker cam and four sparks per two revolutions of the crankshaft.

Fig. 7 shows a sectional view of a vibrating coil as used in the Ford car. This coil, it will be noticed, has a vibrator or a small arm above the core. When the circuit is completed through the primary winding, the current must first flow through the vibrator point, then through the primary winding. When this current flows through the primary winding, it magnetizes the core pulling down the vibrator arm, causing the points to open. As these points are in series with the circuit, the current will cease to flow around the core. At that instant, a secondary current is induced in the secondary winding.

At the same time that the circuit was opened and the magnetism dropped to zero, the spring tension on the vibrator point caused the points to close. This again completed the circuit. The result is that the core will again become magnetized. The points will open and another high-tension current will be produced in the secondary. In actual practice, this vibrator moves up and down at a rate between one and two hundred times per second, producing a high-tension spark each time the points open.

It can then be seen that instead of one spark, a shower of sparks will be produced in the cylinder. If the first spark is not hot enough to ignite the charge, the additional sparks are almost sure to fire the charge in the cylinder. This is considered an advantage, yet at the same time when the lag of the moving parts is considered and the irregularity of the hot spark, the single break system is far superior.

Welding, Cutting and Brazing Practice

(Concluded from page 26.)

asbestos is useful in a paste form mixed with water. This paste is used to back up broken parts and to prevent the melting of babbitt bearings in many automobile castings. Mixed with oil and graphite it makes a good lubricating mixture for special purposes. A metal box filled with asbestos scraps is very convenient for slow-cooling small welded castings. Its non-conducting quality forces the heat to escape slowly.

In many welding shops the asbestos paper is left to shift for itself a great deal. And as a result it is wasted to a large extent. The ends of the roll become frayed, collect moisture and rot, and as a result several inches of the whole roll is lost. Then, too, one end is usually unwrapped and allowed to trail on the floor and be ruined.

Probably the simplest and handiest arrangement is to provide a sling or bracket, attached to the wall, where the roll of as-

bestos paper can be hung in a horizontal position. This permits the welder to tear off just as much as he needs at one time and prevents wet, frayed ends. If a flat iron bar is placed on top of the roll the paper may be torn off squarely.

One article that should not be omitted, in any event, from a list of welding supplies is a quantity of carbon blocks and rods. The blocks are handy for vertical welding and the rods are indispensable for preserving the shapes of holes in jobs where the fracture runs through them—particularly threaded holes. The rod of carbon is screwed into the hole, after which the crack may be welded right up to the carbon without destroying the shape of the hole.

A variety of sizes of carbons should be kept on hand—say from 1/4-inch up to one inch in diameter. The length is immaterial, as usually only an inch or so is needed at one time.

There are many other minor supplies needed at times by the automobile welder, but the forgoing list should be sufficient for the ordinary run of work. We will take the others up in the discussions in other articles of this series.

Steam Tractors Being Introduced Into South Africa.

The general manager of South African railways states that a number of new rubber-tired tractors which were recently introduced in connection with the cartage work in Johannesburg are proving very successful. The load hauled by them averages 70 to 110 tons per day, compared with 24 tons hauled by motor trucks. The quantity of coal consumed in one day by 12 of the new tractors costs very little more than the daily petrol consumption of a single motor truck capable of handling only 24 tons per day.

Some Business-Stimulating Ideas

Progressive California Dealers Find "Poetical" Advertising Is Attention Getting and Paying—Michigan Company Lets Public Know Sales Mark for Which It Strives and Gains Enthusiastic Support—It "Tells the World"

Making "Poetry" Pay.

"The proof of the 'poetry' is in the pay" is the way the progressive firm of Rock & Young, dealers in automobile accessories, bicycles, sporting goods, etc., of Marysville, Calif., might paraphrase the old "pudding" saw when stating their reason for running "poetical" advertisements. Though their way up has not been altogether a path of roses, it has been and is a poetical path—at least in the advertising line—and has proved a paying one.

A few years ago they began business with a tiny bicycle shop, then added a tire shop and began to advertise. Also they chose a motto for use and not for ornament: "If it isn't right, we'll make it right." This motto they live up to strictly and work it into many of their "poetry" advertisements, as shown in one reproduced on this page.

They get right down to cases with concrete examples in their poetry, which they do not deny always contains more truth than poetry. In fact, they are much more concerned with having truth in their poetry than perfect rhyme or meter.

They also make their poetry seasonable and thus serve as a reminder to those who might not take thought and prepare for the needs of the season.

Then, to again focus the attention of those who may have proved forgetful, they ran the one on "spare tires."

They also make use in their advertisements of any event much in the public eye, connecting it up in some striking way with their business, especially the tire part. As, for instance, when the noted train bandit Gardner escaped, they ran his name in a headline, knowing it would attract instant attention; then they gave him and ostensibly others some sage tire advice.

In fact, "Right Up and Coming" might be


HA—HA—HA

—laughed old man Tight,
As he counted up his kale.
"I saved about one-ninety-eight
When I bought that tire on sale."

"Oh Me-Oh My" sighed Mr. Tight
A few weeks later on,
That Whooslt tire ran fifty miles
And now it's almost gone."

"Well, anyway, I've learned a lot,"
So said this Mr. Tight.
"I'll buy my tires from Rock & Young
If it's wrong, they'll make it right."

"Wear Diamonds"



"Poetry" Advertisement of California Dealer is a Reminder to Prepare for Season's Needs.

a slangy epigrammatic statement pertinent to each of their poetry advertisements as well as to the firm itself. When the rush of business overflowed the original bicycle shop and the tire shop, they bought the store behind them and branched out, adding automobile accessories and sporting goods, and continued to hammer out "poetry" that pays.

That corner of the paper in which their advertisement runs is eagerly scanned by many and not only is the poetry commented upon but, better still for Rock & Young, acted upon.

Tell Them Your Sales Mark.

"Hitching the wagon to a star," is good practice for the individual, no doubt, and it will bring results in that case even if kept to oneself—but the S. & H. Motor Sales Co., of Bay City, Mich., is firmly of the be-

lief that the business wagon should be hitched to a star. Then let the world know so that it can watch the course of the wagon and, incidentally, if the vehicle should get into rough going, public enthusiasm may make a helping hand possible.


"Sixty or bust" was the slogan proudly and publicly proclaimed by the S. & H. concern some time ago as its goal for car sales during a given month. It went out to accomplish that much business, and it stirred up enthusiasm by letting all its friends and acquaintances know of the objective.

Moreover, the public was kept informed, as the time went on, as to progress made. When the 40 mark was reached, a big display advertisement made the fact known. When the 50 mark came, that was chronicled. The passing of the quota was re-tailed to the public as well.

In addition, the advertising was made to carry a note of distinct optimism with regard to automobile sales—even in a time that was being generally accredited with being "depressed." One of the advertisements reads as follows:

"An optimist is a man who puts screens on the windows to keep the flies out. A pessimist is a man who takes off the screens to let out the flies."

Such genial prodding of the public, when it was inclined to feel down in the mouth over conditions in general, could not fail to have results. When it was followed by the challenge of the "60 or bust" slogan, a good many men who had not considered themselves prospects for automobiles began to do the serious thinking which ultimately changed their minds.



Laughter he, "I'm glad to see
This article today.
It says, 'Sam Jones fined twenty bones
—Blocked traffic on highway..
One tire blew out and one went flat—
No spare'—Say, it's a crime
To let a guy equipped like that
Run 'round loose all the time."

"Still I've learned from experience,
I used to be as bad,
No spare—cheap tires—Economy—
All bunk.
Trouble's what I had.
Until I got next to myself
And put some DIAMONDS on.
Now ROCK & YOUNG take care of
me—
My tire troubles have gone."

Another Attention-Getting Advertisement That Brought Them In for Spares.

Winning Confidence of Prospects.

Scoggins & Cannon, 314 East Fifth St., Los Angeles, Calif., make a bid for repair work on a basis of letting the prospect know what the cost is going to be. This firm follows up, through the mail, the owners of Ford cars. To them was sent recently this letter:

Mr. Ford Owner:

We have a message for every Ford owner or user, and feel that it ought to be of vast importance to them to know of a place that can and will take care of repairs that are needed on their cars from time to time.

Not just a repairshop, as repairshops go, but a place where you can get the attention you deserve and the good work you must have to make your car a success in your business or for your pleasure, and to make you a Ford booster.

We make a specialty of repairing Ford cars and, if we do say it ourselves, we fully understand the car and its peculiarities and don't waste any time in getting to the trouble and making the repairs to remedy them.

We have made a study of the Ford car and have worked on it for several years, so are able to give you the best to be had along the line of repairs and service.

Now we realize, as you ought, that this is the day of specialization, and any one specializing on any one thing becomes better able to produce results along that line than one who does not. Therefore, we offer you the benefit of our long experience and our completely-equipped shop to help you to solve your repair problems.

Another very important feature is that we contract for repairs on the Ford whenever it is possible, so you know beforehand what the total cost is going to be when you leave your car in our shop.

In cases when it would not be advisable to try to quote a price, we take the job apart for examination and decide with the owner just what is to be done. He knows before the repair is made what the cost is to be to him for a complete and satisfactory job.

This arrangement gives the owner the opportunity to know just what is to be done on the job, and the cost to him when finished, before the job is started.

Can you think of any arrangement that could be more fair or more satisfactory to the owner or to the repairman than to know just what is to be done, and the cost, before the job is started, obviating any chance of misunderstanding that otherwise might arise after the job is completed?

This proposition, as outlined here, made and backed up by a firm that has been in the Ford repair business for a number of years and knows the business from A to Z, along with the other good features we have mentioned, ought to be of tremendous importance to every Ford owner, Ford driver or Ford prospect. Think this over and let's hear from you.

We want your work and will try to satisfy you.

Yours very respectfully,

SCOGGINS & CANNON.

This circular letter was on page one of a 4-page folder. Pages two and three were devoted to a schedule of prices for repairs. These were divided into these divisions: Motor division, rear axle division, front

axle division, miscellaneous repair and specialties which we recommend.

Under the last item appeared timer brushes, coil-box rain protectors, braces, piston rings, easy-riding springs, brake shoes, front radius-rod support, cleaner for the hands, anti-rattle and transmission oiler.

Then under a heading, "A few of our satisfied customers" were listed some well-known local firms.

One of the men to receive one of these letters had just had an experience that made him a logical prospect. He had left his car with a garage to have a certain repair made. The garageman, without consulting the owner of the car, had made more extensive but needed repairs.

Had the garageman called up the owner before exceeding the instructions, there probably would not have been any misunderstanding and the customer might have gone back; as it was, that customer was lost to that garageman forever and he even spoke a word warning others.

At another time his car had been sent out with the fan belt loose, an oversight the repairman acknowledged later.

Thus the letter of the Scoggins & Cannon shop was read with interest, and confidence inspired at the start.

Price Stunt Arouses Tire Interest.

An ingenious plan for creating interest in a new line of goods was tried out recently with good results by a tire shop in Pontiac, Mich. This concern obtained local selling rights for a new tire of cord build. The problem that confronted the proprietor was to get a hearing with the motorists of the trade territory for the tire.

Granted a hearing, it was believed that the tire could be made a winner—especially with Ford and other small-car drivers who wanted a moderate-priced cord.

After considerable discussion, a novel pricing scheme was evolved, which permitted some attractive newspaper advertising and a window display stunt.

The tire was priced for the first day of introductory sales at \$8.80. It was announced that this price held for one day only, and that each succeeding day the price would be advanced 10 cents on the 30 by 3½-inch size.

A tabulation of dates and prices was given in the advertising and on the window-display card, somewhat in this fashion:

| | |
|-------------------|--------|
| Today | \$8.80 |
| February 22 | \$8.90 |
| February 23 | \$9.00 |
| February 24 | \$9.10 |

And so on until the regular list price of \$15.25 was reached.

The effect of this advertising was to cause comment on the tire. The first price quoted was very low—the store maintained that it was below manufacturer's cost—but the low price attracted customers because of the suggestion of a higher value.

Instead of a low price of \$8.80, with only

the claim of superior quality to back it, which would at once have thrown the goods—in public estimation—into the class of cheap rebuilt, or retreaded or second tires, the plan bore on its face the earmarks of a better value in the goods. The chief objects of the advertisement were at once achieved—attracting attention and convincing of a real bargain.

The same sort of plan could readily be adapted to use in handling other accessories, by a careful study of costs and the gradation of prices day by day up to the regular retail price.

Cotterpins and Stovebolts Did It.

I stopped at one of the busy garages in a suburban district of Kansas City a short time ago and was surprised at the amount of business that was going on there. The garage was simply packed with cars which were awaiting repairs. Half a dozen mechanics were busy at them and still the cars came in.

Each time a car came in one of the mechanics was up and met it at the moment it stopped. Each had something to be repaired. Some of the cars were tagged and backed into a stall; others were given immediate attention. I noticed one in particular.

"Got a rattle in the front fender," one driver said.

"You need a stovebolt," the mechanic replied, and forthwith he fastened the fender with a bolt—the work of a few minutes.

"What's the damage?" the driver asked.

"No charge. Come again." And the car drove out.

"You can't make a living at that," I volunteered.

"That's how we make a living," the mechanic laughed.

"I don't get you."

"Stovebolts and cotterpins bring us the business. We get them by the barrel so that they cost us little. If we should charge a quarter for them, we'd be just like the other garagemen, and the other fellow would stand an equal chance at their big jobs.

"This fellow will be coming in some day with a real repair job because we didn't charge him anything for the stovebolt, and we always charge for the big jobs. Stovebolts and cotterpins are our pulling cards. That's why we never run out of work in this shop."

There is certainly food for thought in his statement for the man who is working for a permanent future garage business.

Automobile Association in London Furnishes Tourist Service.

In England an automobile association furnishes pilots familiar with the metropolitan area of London to tourists on the outskirts of the city in order to guide them by the best route, avoiding traffic, etc.

The service is also made available for shopping and sightseeing.

Practical Hints for Shop Mechanics

Bent Running-Board Supports.

Running-board supports sometimes become bent, allowing the running-board to sag down. The best method of easily straightening these is as follows:

A steel bar, such as a drive-shaft, is securely lashed to the support just back of the running-board and a block placed between the shaft and the running-board. A slight lift on the bar will bend the support as much as is desired.—D. & F., Mo.

* * *

Spark-Plug Tester.

Many mechanics will test spark-plugs by placing them on the block of the motor and turning the motor over with the plug connected to the commutator. If a spark passes between the points of the plug the mechanic concludes that the plug is not at fault.

This method is very unsatisfactory and misleading for, while a spark may pass between the points at atmospheric pressure, the 40 to 60 pounds' compression pressure of the motor will offer enough resistance to cause the plug to short-circuit if it is defective. Some mechanics attempt to approximate this resistance by spreading the points of the plug, thus forcing the spark to jump a greater distance.

This bending of the points will sometimes result in a broken point. A better method of offering resistance is as follows:

A short strip of sound mica is placed between the points for the test. The spark is forced to jump around the sides or ends of the mica to pass between the points. The resistance may be varied by shifting the strip. With such test strips plugs may be given a test that will show any defect, yet the points will not be injured by bending.—L. R. B., Iowa.

* * *

Putting in Valve Spring.

Seeing a tip for putting in a Hudson valve spring, I am suggesting the following:

I have been using the method shown in the illustration for nearly the whole of my 21 years of experience and have yet to find a better or a simpler one. Also, it is very easy to make.

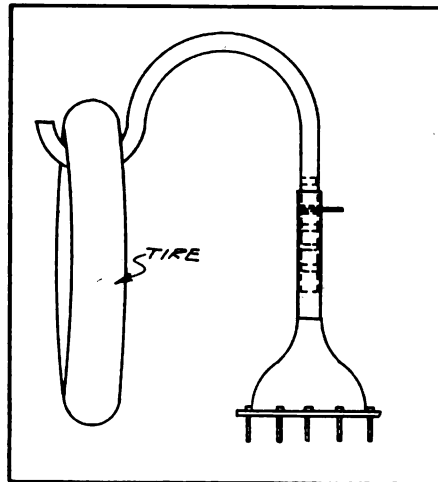
By wiring in pairs, they take up very little room in the tool box. I usually cut mine from $\frac{1}{8}$ -inch strip iron and bend over cold to suitable length, which is easily found by compressing the spring in a vise and then taking the measurement between the jaws. Then make the clips about $1/16$ -inch longer. All that

is necessary, for all springs, are two pieces of $\frac{3}{8}$ -inch or $\frac{1}{2}$ -inch square, bent for the vise, and two clips for the spring.—S. F., Colo.

* * *

Handy Tire Holder.

When the inside of a tire is being examined, some sort of a holder is very convenient. If one half of an old rear-axle



Holder Convenient When Examining Tire.

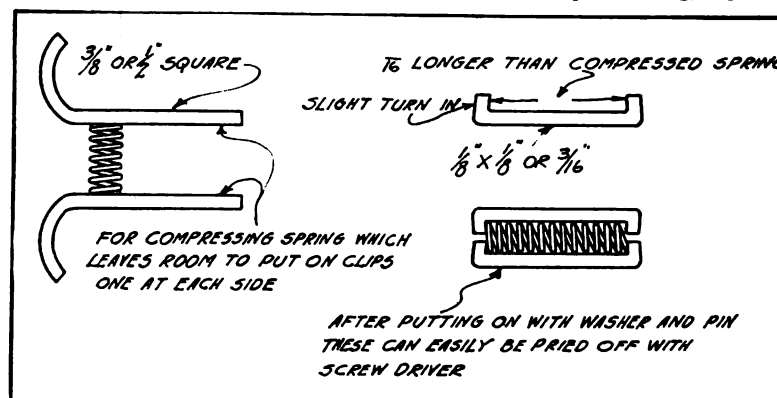
housing is bolted to a bench and fitted with a piece of pipe, as shown in the illustration, it will prove very useful. The hook may be adjusted by removing the pin and sliding the pipe up or down to a new hole.—S. E. G., Iowa.

* * *

When Replacing Clutch Springs.

In repairing different types of clutches, it frequently requires considerable effort to replace springs. Some clutches are particularly hard to replace—such as in the Overland, Buick, Reo, Studebaker and similar cars, which have the three suspension springs to be pressed back before the nut can be placed on to hold for adjusting.

A good tool can be made from a 3-foot spring leaf, by cutting off and flattening it at the end, cutting the end in the shape of



A Simple and Useful Method for Putting in Valve Springs.

a V. This will give you a tool that will lie on the springs and will enable you to press the cap back over the end of the clutch-spring bolt so that the nut can be easily started.

Keep this device, for it will surely come in handy often in the busy shop. My shop finds it a good timesaver.—G. F. H., N. C.

* * *

Cure for Grabbing Clutches.

Cone clutches will sometimes grab, even though the lining is not worn. When this happens it is usually because the leather facing has become dried and hard. A little neat's-foot oil if applied to the facing will soften it and cause the clutch to engage without a jerk.

The disks of a dry disk clutch may be kept from grabbing by applying a little lubricant to the disks. Castor oil is good for this, but care must be taken or too much may be used and the clutch will slip. Only a few drops are needed and a convenient method of applying it is to mix one part of the castor oil with five or more parts of high-test gasoline. Mixed in this way, the oil will be distributed evenly to the facing and yet the gasoline will evaporate quickly and leave only the castor oil lubricant.—M. R., Kans.

* * *

Inserting Combination Backing.

I have worked out this little idea which I find to be very satisfactory and a saving of much valuable time.

With the usual way of inserting combination backing in a blowout of an inner tube, the backing will sometimes stick together and is very clumsy to insert. Also if you are not careful, the hole in the tube will tear. This is especially true in a small blowout.

Get a pint jar and fill with some high-test solvent, such as gasoline or benzol, etc. Find a round piece of wood four inches long and about $\frac{1}{4}$ -inch in diameter.

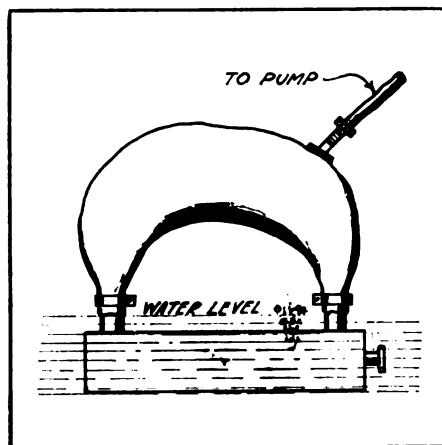
When you are ready to insert the backing, dip it into the high-test solvent. Lay the backing on the blowout in the tube, which is on the repaired slide. Then raise one side of the tube with one hand and with the other hand push the backing in with the stick. In a few seconds the solvent will evaporate and the backing can be rolled to the tube.

The high-test solvent is used because it prevents sticking before it evaporates and at the same time does not destroy the adherent qualities of the backing.—H.

Finding Radiator Leak.

A small leak in a radiator is often very hard to find. Sometimes the water will seep out only when the vibration of the car opens the seams.

By putting the radiator under water and subjecting it to from five to ten pounds'



Radiator Is Immersed in Water.

internal pressure, the leaks may readily be found. The apparatus shown in the illustration will make the test.

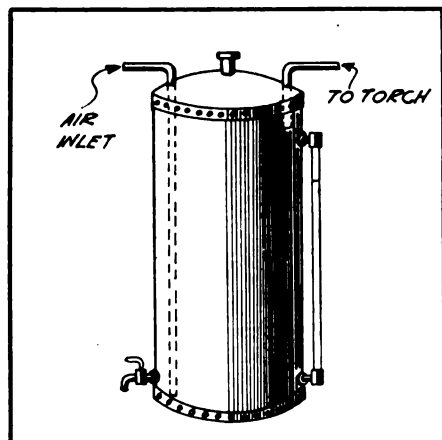
A section of small inner tube, having a valve stem, is secured. This may be made from a tire that has outlived its usefulness yet will hold a few pounds' pressure. The section of the tube is fastened to both the inlet and outlet of the radiator with suitable hose clamps.

A tire pump is attached to the valve stem and the radiator immersed in water. By pumping a slight pressure into the radiator, the leaks may be detected by the rising bubbles. This scheme may be used to good advantage in testing radiators.—L. R., Iowa.

* * *

Home-Made Generator.

The illustration shows a home-made generator which I have found very efficient. I will try to make the principle clear, al-



This Home-Made Generator Found Efficient.

though some little experience is required to obtain the best results from any generator of gasolene.

To begin with, the pure gasolene is too rich. In other words, the air, after being

filtered through the fresh gasolene, is too rich and does not give off sufficient heat for good work.

After the air has passed through the gasolene for a time, the flame produced becomes much hotter and does the best work possible in any kind of soldering. Then, after a time, the gasolene becomes weakened by having the qualities which are easily vaporized carried off. Again the flame loses its heat. It is now necessary to add more gasolene to the generator. By practice, the operator learns just how much to add at a time in order to keep the flame at its best at all times.

In all this gasolene, there is a considerable quantity which must be removed from time to time. It is the residue which does not vaporize readily, but it must not all be removed or, when the fresh gasolene is again put in, it will be too rich.

I have made several generators and the one I like the best is made of No. 22-gage galvanized iron. It is six inches in diameter and is 18 inches high. I put a filler neck and cap on top and soldered a drain cock into the side near the bottom, for the purpose of drawing off the residue.

I secured the brass fittings which hold the water glass in steam boilers and soldered them onto the side of this generator. This shows just how much liquid is in the generator at all times, as well as the amount drawn off and the fresh supply put in.

Two quarter-inch holes were drilled in the top. Through the one, a copper tube was inserted which reached to the bottom. After soldering it into place, the four inches protruding were bent at right angles. A short piece of tube was inserted an inch into the other hole, soldered into place and also bent over.

The air was introduced through the long tube and, after bubbling up through the gasolene in the generator, is forced out through the short tube to which the torch tube is connected. A second receptacle could be placed above this generator and connected to it with a pipe containing a shut-off valve. Then, by filling the upper tank with gasolene, any desired amount can be let into the generator at any time.

A gallon of gasolene, divided into a few proper fillings, will run this torch about two days, furnishing a cleaner, more effective flame for soldering and lead burning than anything I have used.—C. O., Neb.

* * *

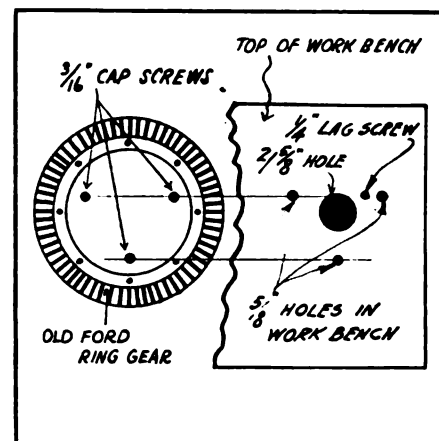
Disassembling Ford Rear Axle.

As shown in the illustration, secure an old Ford ring gear by screwing into each hole, head or tooth side of gear, a 5/16-inch cap screw, 1½ ins. long. Screw the cap screw into the hole until it projects ¼-inch through the hole, the projection to act as a lug for the differential housing when assembling.

Next place the ring gear face up on the workbench, where you desire to locate the vise, and tap each bolt lightly, which will scribe three places for ⅝-inch holes, which

must be bored into the workbench one inch in depth to receive heads of 3/16-inch cap screws A. L. A. M. thread.

Turn the ring gear face down over the holes in the bench, and the heads of the capscrews in the ring gear will fit snugly in the holes just bored. Next, center the



Labor Saver When Working on Ford Rear Axle.

ring gear with compasses or any convenient tool at hand, and in the center bore a 2⅝-inch hole in the bench, this to allow extending the axle to project through the bench while working on the assembly.

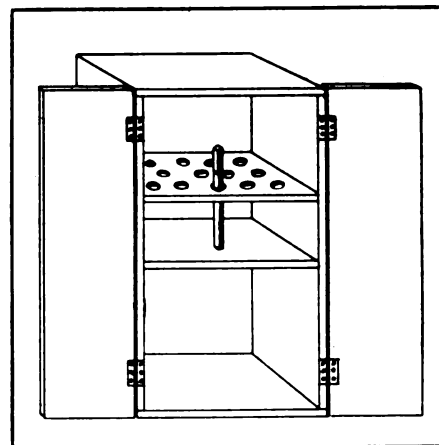
Next, screw into the workbench, ⅝-inch from the edge of the large hole, a ¼-inch lag screw with the head rounded. Let this screw project ⅝-inch above the top of the bench. When the differential housing is reversed, this screw prevents it from turning while it is being worked on.

This is a great labor saver, as it is a very tedious job to work on a rear axle or differential assembly in a vise.—E. H., Va.

* * *

Reamer Cabinet.

We made a cabinet to keep our reamers in, as follows: An old box was used and a plain shelf was put in it, in the center. Then we took another shelf and bored holes



Old Box and Shelves Make Reamer Cabinet.

in it to fit each size of reamer, and nailed it in the box about six inches above the plain shelf. The reamers were put through the holes and the ends allowed to rest on the plain shelf.—O. B. R., W. Va.

CURTIS *Single Stage and Two-Stage* AIR COMPRESSORS

FREE
CURTIS AIR
FREE FROM OIL

This Curtis Sign — 14x20 inches — baked enamel on heavy steel. Furnished at small cost to users of Curtis Garage Air Compressors.

Curtis Single-Stage Compressors—the most popular everywhere. Have controlled splash oiling system—runs ten to fifteen times as long on same amount of oil. Fan flywheel—aids in keeping cylinder cool. Hand unloader—prevents blowing fuses and jumping belt. Head removable without loosening pipe connection. Also many other exclusive features. Several styles and sizes.

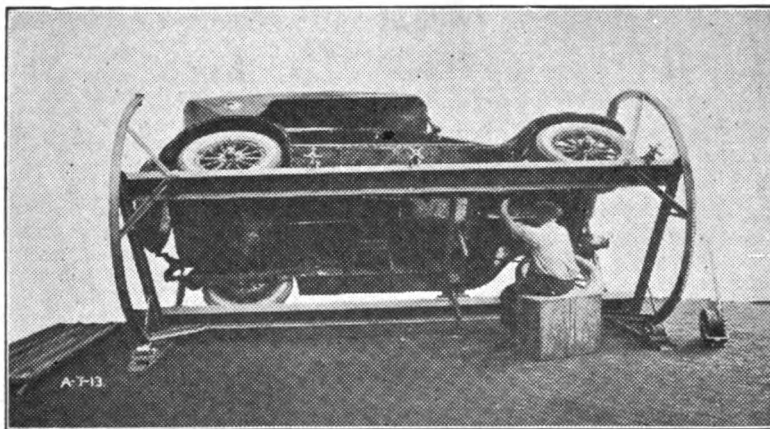
Curtis Two-Stage Compressors have same features that established our single-stage so strongly and in addition have all possible advantage of two-stage compression. Exclusive Aeroplane type COPPER intercooler with thin radiating fins rigidly attached assures fullest advantage of two-stage compression. Several styles—two capacities.

Curtis Pneumatic Machinery Co.
1515 Kienlen Ave. St. Louis, Mo.

Branch Office:
530-U Hudson Terminal, New York City
Canadian Rep., Joseph St. Mars,
706-B Sterling Bank Bldg., Winnipeg, Can.

Curtis Model B Single Stage Outfits.
For full information see your jobber.

Here Are Just a Few of the Many Advantages of Repairing a Car on The Turn-Auto



1. Mechanic can work in a natural position without lying on a damp, greasy, and hard garage floor.
2. No dangerous gas-filled and unsanitary pits.
3. No chain hoist to slip or break, injuring the mechanic beneath the car.
4. Car may be rotated in either direction, thereby eliminating the necessity of removing oil, gas or water.
5. Repairs can be made with savings from 50 to 90 per cent.
6. Absolutely impossible to mar or damage the car.

It will be to YOUR advantage to write for illustrated booklet TODAY—make us convince you that the Turn-Auto will more than double your profits.

Sold on easy monthly payments

THE AMERICAN TURN AUTO COMPANY

40 West Gay Street

COLUMBUS, OHIO

Readers' Questions and Answers

Raising Capital for Expansion.

The writer has been before the public a good many years in various capacities, and in the present business for 11 years. I have contemplated putting in a stock of automobile accessories, free air and water. I own the property and have a corner lot on which the business room is located, facing the street in the rear and abutting on an alley. There is room enough for a service garage.

To put up a garage would necessitate my borrowing money. I was wondering if I might not be able to effect an organization along some plan whereby I could sell sufficient stock to enable me to build and equip from the proceeds on the sale of stock and make it a paying proposition.

Could you help me with some plans for effecting an organization, either as a stock-participating or a membership certificate co-operative plan? For instance, on putting up \$10, \$15, \$20 or \$25, issuing a membership certificate entitling such holder to a cash discount on any and all supplies he might buy from time to time and, in addition, every year or semi-yearly, pay them a percentage of the net profits from their business on total amount of business transactions during such period of time?

My location is on a prominent paved street, the most available cross-over between two main thoroughfares, making a semi-transit and, at the same time, a semi-neighborhood location, appealing especially to the business of the neighborhood for their patronage, as I have been informed by a jobber's agent. The uptown is gradually losing out on service from the fact of congestion and traffic restrictions.—J. P. F., Ohio.

There are several ways in which capital can be raised for expansion without giving away everything to do it, but don't try to sell membership certificates in small amounts and expect to be able to give your business the attention it would require. Everybody and his friends would be at you all the time, and it would be more bother than it is worth. It is natural for people to want to do something for their friends and, instead of getting a legitimate profit, you would be selling accessories to a stockholder for one of his friends.

One way to expand is to incorporate, issuing enough stock to cover your share of property and new improvements. Be sure you make it enough to begin with, as it is hard to get across an assessment. You should, if possible, control the majority of the shares—in fact, it is necessary if you wish to run your own business. You must have three or more directors to incorporate. Have a good lawyer handle the details for you.

Another way of raising capital is to turn your property over to a trust company or bank which, in turn, will sell bonds for \$100, \$500 and \$1,000, maturing a certain

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your business, the more you will know—and the more you know, the more money you will make.

Whether you are a dealer, a salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

amount each year until the indebtedness is cleared. You will have to pay a good premium charge for this and also an attractive interest rate that will appeal to people.

Your being in the same locality for so many years should be a good asset for you in getting the confidence of moneyed men and investors.

There could hardly be a better time than the present for launching your enterprise, since practically everyone now is interested in investments and we believe you would have little difficulty in carrying your plan to a successful conclusion.

* * *

Ford Choppy While Idling.

If possible please offer your solution to the following:

We have a Ford and it runs choppy while idling. Everything possible has been tried, such as new carburetor, new harness and wires, new timers and rollers, new manifolds, valves reground and refaced and re-seated a number of times, and then new valves throughout put in.

New rings were also installed, and a new head gasket. A new head gasket of a different make was put in and finally two together, but with no result. A new cylinder-

head was then put in, also new coils and coil box, and then the motor run direct from a battery without going through the switch.

It still runs the same. I might add that No. 2 cylinder is badly scored. The car is a model 1921, equipped with self-starter.—V. J. I., N. Y.

From your description of the trouble which you are having with the 1921 model Ford motor, it would seem that you are getting a weak mixture in one or more cylinders, or perhaps poor compression due to the scored cylinder.

The gaskets between the intake manifold and the cylinder block may be in poor condition, allowing air to get into the mixture above the carburetor. This would cause a weak mixture in one or more of the cylinders, causing the motor to operate in the manner you mention. Also, if the cylinder is badly scored, it would cause weak compression and the motor would misfire at low speeds.

We would suggest that you make an inspection of the gasket between the carburetor and manifold; also of the gaskets between the manifold and cylinders to see that they are in good condition.

As to the scored cylinder, it may be repaired either by having the scores filled by some repairshop making a specialty of this sort of work or, if the other cylinders are in poor condition and the scores are not too deep, all of the cylinders may be reground and new pistons and rings fitted.

However, if the scores are deep in the damaged cylinder we suggest the former procedure; that is having the scores filled or replacing the block with a new one.

We do not believe that the magneto or ignition is causing the trouble you describe. You do not state that the motor is misfiring at higher speeds and we assume that it is not.

* * *

Knock in Ford Motor.

We have a Ford that has a knock. I have put in new piston pins, rear main bearing, timing gears, have taken up the end play—or any play—in the camshaft, and have also taken up all bearings. It still has a knock like a piston slap. Could it possibly be in the transmission?—J. M., Wash.

It seems to us there can be no doubt that the fault is in the connecting-rods. Should a connecting-rod be sprung, it will cause a slap resembling the piston slap very much.

All pistons are made with the boss openings at the top sufficiently wide that the upper end of the connecting-rod can move sidewise from one-eighth to one-fourth of an inch.

In case the rod is sprung as the crankshaft turns to its highest point, this rod



Sell this Quality Tire at a big profit to yourself

The Lincoln Tire & Rubber Co. is offering a special sales proposition on the Lincoln Tire. It is such an unusual proposition that it will enable even the dealer in small quantities to meet the **keenest** competition and yet sell a "quality" tire at a big profit.

The Lincoln Tire is a QUALITY tire. Fabrics are guaranteed for 6,000 miles, and cords for 8,000 miles.

And the Lincoln Tire is a trade builder.

Your territory may be open. Wire or write at once for this exclusive sales proposition.

Lincoln Tire & Rubber Company
714 Prospect Ave. Cleveland, Ohio

will slide on the pin or in the bearing, striking one side of the piston and if it turns to the lowest point at the bottom, the top of the connecting-rod will be suddenly slipped against the other side. Therefore, the knock resembles very much that of the piston slap.

* * *

Piston Oversizes.

Enclosed find stamped envelope for return information on the following subject:

In mathematics, the decimal 0.005 would be larger than 0.0025, but oversize pistons are listed as standard 0.005, 0.015, and 0.0025 oversize, which would indicate that 0.005 is smaller than 0.0025 oversize. Is this the case?

Please give the fractional part of an inch oversize of 0.005, 0.015, 0.0025, 0.03125 and 0.033 oversize pistons.—E. L. S., Ohio.

We know of no manufacturer that lists oversize pistons in the order that you mention.

We assume, therefore, that there was a mistake in the list you happened to have at hand. Probably the 0.0025 should have been at the first of the list as it usually is placed. This size can often be put in a slightly worn cylinder instead of the standard size piston.

Many firms make a 0.025 oversize, and the mistake you noted might have been caused by the printer using one too many ciphers. 0.0025 is but one-half of 0.005.

0.0025 = 25/10,000 or 1/400.

0.025 = 25/1,000 or 1/40.

0.033 = 33/1,000.

0.005 = 5/1,000 or 1/200.

0.03125 = 3125/100,000 or 123/4,000.

0.015 = 15/1,000 or 3/200.

* * *

Mortgage Has Prior Right to Lien.

We sold a model 75-B Overland car and received a mortgage on the car. The purchaser could not pay the notes and told us to close the mortgage. Before he told us he could not pay, he took the car to another garage and ran up a \$90 repair bill. The purchaser is no good and he refuses to pay the repair bill and the garageman refuses to part with the car until the repair bill is paid.

Can we get the car without paying the repair bill according to law? How? In other words, have we any way to protect ourselves in the future against anything of this kind when we sell a car?—W. E. G., Ohio.

You have a right, under the law, to recover the car without paying the repair bill, provided your mortgage was recorded in due form or the garageman had actual knowledge of it.

This presents a nice, intricate point of law and we have no doubt, unless the Ohio law is explicit on the point, that you will have a lawsuit on your hands when you attempt to foreclose the mortgage and take the car. We are willing to advise you to do this, however, in view of our examination of the authorities, feeling certain that you are entitled to relief.

The garageman is exhibiting some knowledge of the law when he refuses to part

with possession of the car until his bill is paid, but he does not know, evidently, that a mortgage creates a paramount right in property as against ordinary liens, and the law presumes that every other person who

Now It's Your Turn.

In answering these queries concerning the difficulties arising in garage work, we have given the generally approved methods.

But we realize that many of our readers will have a different way of "doing the trick," and can offer interesting and helpful suggestions from a different angle. So we would like to have you tell us whenever you have a different method for handling these various questions.

Let's make this a Round Table for the exchange of ideas and thus be mutually helpful!

acquires rights or liens to property that has been mortgaged acquires them with full knowledge or notice of the mortgage or mortgages and that the latter are paramount or prior to such subsequent rights.

Of course, where the mortgage is unrecorded, you get into hotter water and the mortgagee sometimes loses out as against a lienor, but this is very seldom.

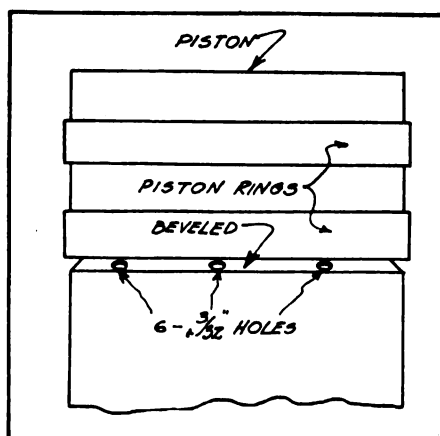
* * *

Method for Boring For Piston.

Will you please tell me how to bore a Ford piston so that it will not pump oil? Where is the best place to put the holes and what size should the holes be?—R. T. W., Fla.

There are many methods of boring the Ford pistons which are claimed to be the best remedies for oil pumping.

If a groove is cut just below the bottom ring, or the lower edge of the bottom-ring



Boring Ford Piston for Oil Pumping.

groove is beveled off slightly, it will catch much of the oil which is wiped off the cylinder walls by the ring. Holes should be drilled through the wall to let the oil escape. Six holes, 3/32-inch in diameter, should serve well.

Recharging Ford Magneto.

I have a customer who is now thinking of having a Ford magneto recharged. Please send me information on how to charge a magneto while in the car, also the materials needed.—W. R. S., Mo.

Use 30 volts from storage batteries—five 6-volt batteries connected in series; that is, connect the positive pole of one battery to the negative pole of the next one to it and so on until all five batteries are connected.

Now, with an ordinary watch compass held closely above the transmission cover, find the north pole of one of the magnets. Then have someone turn the motor slowly until the north pole of the magnet is about one or 1½ inches to the left of the magneto contact plug, and the south pole will be about the same distance to the right of the magneto plug.

Connect a wire from the positive pole of the batteries to the magneto contact. Connect another wire to the negative pole of the battery. With the opposite end of the wire, touch the motor or frame of the car 15 or 20 times, just for an instant each time. If the contact is held on any length of time, it will melt the contact spring in the magneto plug.

The crankshaft should vibrate endwise in the motor. When you make a contact with the wire on the motor, if it does not vibrate, sometimes it can be started to vibrating by working the emergency brake lever up and down.

After making the contact 15 or 20 times, turn the motor exactly a quarter turn. The magnets should be in the same position with the compass. Then go through the same operation as before.

Turn the motor another quarter turn and go through the same operation again. When you have recharged all four quarters, disconnect the wires and start the motor. Test the magneto with a voltmeter.

Magnetos on cars of the 1915 model and later should generate 30 volts at the highest speed of the motor, while the older models will generate only 20 volts. If they are weaker than this, it will cause the motor to start hard.

If the instructions are not followed out carefully, the magnets of the magneto will be demagnetized instead of recharged.

* * *

Lubricants Containing Animal Fats.

We are often advised against the use of greases which contain animal fats. What are the objections to such greases?—L. R. V., Okla.

Animal fats are introduced into the manufacture of some greases for the purpose of giving the lubricants more body. Such greases are likely to become rancid after being used for a time, and the fatty acids which are thus freed may act injuriously upon the finished surfaces of gears and anti-friction bearings.

There Are Many Styles
Of Permanent Tire Carriers

The

2-R-3

TIRE CARRIER

FITS ALL OF THEM

And Enables You to Carry as Many Spares as You Want

IT IS THE ONLY ONE THAT DOES



Model Y



Model S

To the Dealer this means that every car owner is a customer and that one line of carriers in stock will meet the requirements of every buyer.

To the Car Owner it means that one 2-R-3 Carrier may be changed from car to car as the old car is replaced by a new one.

To Everyone it means Service, Satisfaction, Economy and Profit.

INTERNATIONAL STAMPING COMPANY

402 North Leavitt St.

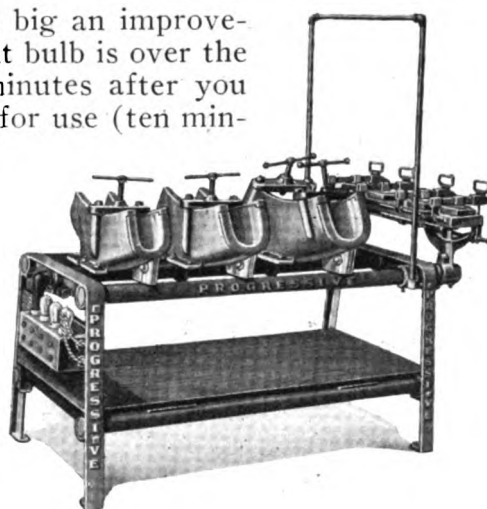
Chicago, U. S. A.

PROGRESSIVE

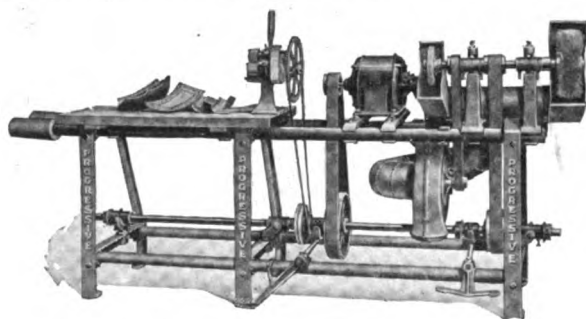
TIRE SHOP EQUIPMENT

The Progressive Electric Vulcanizer is as big an improvement over steam outfits as the incandescent bulb is over the kerosene lamp. In thirty to forty-five minutes after you turn on the current, the cavities are ready for use (ten minutes for the tube plate); and with forty-five minute gum the casing is ready for your customer before a steam plant could be ready for the casing. Patented Thermo-Switch Control keeps heat at exactly the correct temperature and makes a burn impossible.

The Progressive Buffer-Bench Combination includes a scouring and buffing machine, a dust removal system with powerful exhaust fan, a fabric skiver, a work bench with handy set of rollers; a solid rigid frame with complete countershaft and clutches. You can get **all** these features in **one outfit** at a much lower cost than you would have to pay for similar things bought **separately** elsewhere. Equipment can be varied to meet special requirements.



The Progressive Catalog 1-B illustrates, describes, and prices 28 items of Tire Shop Equipment. Every one of them would be a money maker for you. Every one of them can be purchased on our EASY PAYMENT PLAN. It will pay you to have a copy of this book, and learn in detail just what Progressive Tire Shop Equipment will do for you.



THE P. S. M. COMPANY

3116-36 Snelling Ave., S.

Minneapolis, Minn.

"Send
for
Catalog
1-B"

Finding and Repairing Tire Damage

(Concluded from page 24.)

less driving of this sort may also cause separation of the tread.

Tread and ply separation are commonly caused by overloads or underinflation. An exaggerated bending or flexing motion is given to the tire, resulting in the friction cushion between each ply being stretched beyond its elastic limit and broken.

In the past, some car manufacturers equipped their cars as cheaply as possible using smaller sizes of tires than were designed for the load. An overload of this sort has the same harmful effects as underinflation. The table given shows the recommended load for each wheel equipped with a certain size tire. The load on each wheel may easily be checked by driving the car onto a large scale. The table of air pressure presented in this article averages those given by leading tire manufacturers.

When a tire is worn down evenly around its entire circumference, and has not been in service long enough to warrant such wear, it is probable that it has been abused by spinning wheels. Small grooves are

| Size. | | —Fabrics— | | —Cords— | |
|-------|-----------|-----------------|------|-----------------|------|
| | | Lbs. per wheel. | Alr. | Lbs. per wheel. | Alr. |
| 3 | ins. | 375 | 45 | | .. |
| 3½ | ins. | 570 | 55 | 600 | 50 |
| 4 | ins. | 815 | 65 | 850 | 60 |
| 4½ | ins. | 1100 | 75 | 1200 | 70 |
| 5 | ins. | 1500 | 85 | 1700 | 80 |

Pressure and Loads for Various Sizes and Types of Tires.

often cut around the entire circumference of the tread. If a car becomes stalled in a mud hole and it is necessary to spin the wheels, the tire will be badly damaged by stones or glass in the rut. Sometimes the cut may extend into the fabric, ripping it about the tire and making the tire practically worthless. Injuries that are slight and do not extend into the carcass may be repaired.

The side walls of a tire are not manufactured to withstand wear, and a tire is particularly susceptible to injury at this point. Side-wall cuts may be caused by cans, bottles, stones and similarly shaped

objects. Running over the edge of a bottle may make, not only a tread cut, but the side wall may be injured where the glass is tipped against it.

Scuffed side walls result from running against the curb or pinching the tire in a rut. Most of these injuries can be avoided by careful drivers.

Careful inspection of tires and suitable repairs will mean many more miles per dollar to the average driver. The old axiom—"A stitch in time saves nine"—has no more fitting application than to tire repair.

It is the duty of every repairman to encourage frequent inspection of tires. The motorist must be educated in the care of his tires, he must realize that tires cannot be repaired satisfactorily if they are neglected too long. Much of the present dissatisfaction toward tire repairwork may be done away with if the car owner understands the proper care of tires, and it is to the advantage of the tire service man to see that he recognizes the difference between use and abuse.

Here and There in the Motor World

Stewart Batteries Built on Principle of Dependable Service.

The "call of the road" has come. It matters not whether the trail leads out to the "Golden West," to the tempting coolness of the North, the drowsy warmth of the South or the life and color of the East—it is one and the same. Every highway will have its unceasing stream of motorists, all hurrying to some favored summer playground.

And everywhere the wide-awake dealers, service stations and repairshops are busily planning to meet the demands which will be made for service and supplies of all kinds, each one recognizing that, in order to get his share of this attractive business, he must meet these demands with the kind of service and supplies that will make his customers say: "I'll make a note of this place. I may need something on my return trip."

That is why you will be interested in reading of what one battery manufacturing company is doing to make it pos-

sible for you to sell your customers a battery that will give them dependable service.

First, just a glimpse at some of the activities of this big plant—for even so brief a "trip" through the Stewart Storage Battery Co.'s plant at Marshfield, Wis., will help you to understand why this company stands ready to back its product with a positive two-year written guarantee and why its slogan is: "Built up to a principle—Not

down to a price." It must give real service.

We visit first the president's office, for E. J. Stewart, the genial president of the Stewart Battery Co., is ever anxious to render the same co-operation as is evidenced throughout the Stewart organization. It is Mr. Stewart's personal aim to construct an automobile storage battery built on a principle, for performance, sacrificing no effort in using the highest grade of material and workmanship to attain this high standard.

And then the advertising and dealers' help service department, where F. E. Whittemore, the Stewart company's courteous and energetic sales manager, tells of the countless and ingenious dealers' "helps" which that department is ever ready to supply Stewart dealers. Display cards, posters, trail maps, signs, hand bills, mailing cards, blotters and what not. There is even a set of attractive movie slides, by means of which the dealer can utilize the wonderful publicity value of his local mo-



President, E. J. Stewart, is Ever Ready to Co-operate With Dealers.

Announcing the —



STEEL BLUE PISTON RING

The First and Only Everlasting Piston Ring

HERE ARE THREE FUNDAMENTAL FACTS:

- 1—It is heat, not wear, that spoils a piston ring.
- 2—Compression leaks are at the side of the ring, not through the joint.
- 3—Less than one-half of one per cent of compression leaks are ever through the joint of a properly fitted ring.

HETE-PRUF Rings are heat formed to true circles, then heat treated by our patented process which makes them proof against any heat action up to 700° Fahrenheit—300° hotter than they will ever get in a motor.

Other rings begin to deteriorate at 200° Fahrenheit.

While others have been striving to meet the piston ring problem by means of multiplicity of parts and complicated joints, we have perfected, patented and applied to piston ring construction a heat treating process that produces a ring that is

- 1—A perfect circle with the correct wall pressure Uniformly Distributed throughout its length.
- 2—A soft Surface, Quick Seating ring that will not cut or score the cylinder wall under any circumstances.
- 3—A Ring that is absolutely Heat Proof and therefore Everlasting.

HETE-PRUF Rings are Absolutely Right, Everlastingly Stay That Way, and are guaranteed to retain their true circular form, uniform wall pressure and tension throughout the life of the motor. Having produced these rings for leading car and engine Manufacturers for use in special jobs with uniform success for the past three years, we now offer them to the trade with the assurance that they are in every way the Best and Most Durable piston rings ever put in a motor. Sold to the trade through regular channels.

Write our sales department for circular and prices.

Manufactured by
**LEESEBERG MACHINE &
MANUFACTURING CO.**
Fostoria, Ohio

Sales Department
THE ZINKE COMPANY
1329 Michigan Ave.,
Chicago, Illinois

tion picture theaters to good advantage.

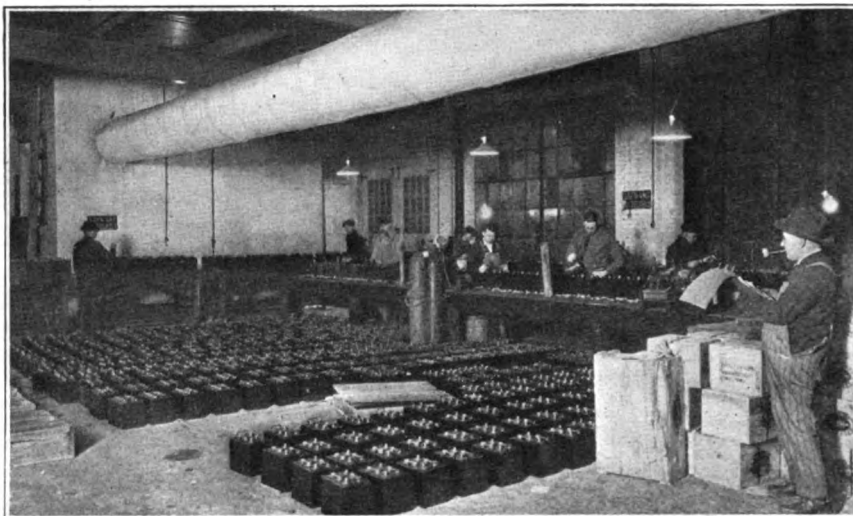
The possibilities of the growing interest in radio transmission have not been overlooked by this up-to-the-minute service department. It is prepared to supply dealers with radio information in all its various degrees and to aid them in building up a profitable business through selling and recharging storage batteries for use in radio work.

Next we go to the office of the general office manager and the credit, order and service adjustment departments. Here we meet the factory superintendent, Mr. Galvin, who, in spite of the many details claiming his attention, is ready to conduct us through the factory.

We enter first the department where the grids and other lead materials are molded, pausing a moment to note the furnace containing the molten lead combination which is constituted of 93 per cent lead and 7 per cent antimony, and passing the parts molding division from which the parts are thoroughly inspected, tested and passed on to the general stockroom.

Then into the mixing room, where the special paste mixture is mechanically combined for use in filling the grids and making the first steps for manufacturing the "green" plates. In one workroom we see the workmen filling the grids with the Stewart special paste, each plate being carefully pasted, scraped and all crevices positively filled and packed securely.

In another department, after inspection and cull outs, the "green" plates are separately hand-rolled under direct pressure and passed through to the sorter and inspector to be placed in a movable conveyor for setting and drying.



A Constant Stock of Batteries Always Ready for Charging at Stewart Plant.

Now to the drying room, into which the movable conveyors are rolled for a period of 72 hours and subjected to a drying temperature of 110 degrees. Here you will always find a dozen or more conveyors filled with "green" plates under this drying process.

In another room, you find the workmen with their racks filled for burning on the pillar strap posts, all "green" plates having been thoroughly inspected after coming out of the drying room. And then we see the burning-on bench where workmen are placing the separators under the supervision of an inspector.

These separators have been specially treated and are guaranteed to be genuine Port Orford cedar—which, we are informed by Mr. Galvin, who is said to be one of the best-posted battery men in the United States, has the longest length of life combined with the least amount of resistance. After having been burned together into what is known as positive and negative groups, the "green" plates are passed on to another division.

Next we see the groups connected up into elements and placed in treating tanks to undergo what is known as the period of

formation. Here, also, we see the workmen fitting the elements into hard rubber cells. After undergoing a rigid inspection, these cells are placed in hardwood cases which have been carefully stained and painted with high-grade, acid-proof paint. The black battery cases are then filled with cells.

On we go to the next department, and there we find a large number of movable conveyors filled with batteries. These batteries are passed down the line of

workmen who assemble, burn on the connectors, seal the cells with paralite and pass the batteries forward for charging. There is always a constant stock of batteries ready for charging, for the Stewart Storage Battery Co. endeavors at all times to keep the production of Stewart batteries where the hold up in shipment will not inconvenience the dealer, when his order passes through to the shipping department.

From the finishing department, the batteries go to the department where they are hooked up in series and charged. All Stewart batteries must come up to a regular standard test of 1280-1300 specific gravity and better than 1½ on a negative cadmium test before being checked off the tables. Then we see the final inspection and go on to the electric room where the charging energy is generated.

All along the line, we note the careful workmanship and the rigid inspection given these batteries—the constant supervision at each stage of their manufacture.

You will want to get acquainted with the Stewart sales plan and sales co-operation methods—a request addressed to the Stewart Storage Battery Co., Marshfield, Wis., will bring you full particulars.

Accessories—Dealers' Key to Profits

New President For A. Schrader's Son, Inc.

A. Schrader's Son, Inc., of Brooklyn, New York, announced, April 3, that M. Charles Schweinert, who has for over 35 years been associated with it in various capacities, such as general manager, treasurer, director, and president, has resigned his official position with the company. Mr. Schweinert has, however, because of his wide knowledge of the corporation's business and his engineering and mechanical skill, been retained by the corporation in an advisory capacity.

As Mr. Schweinert's duties in such ca-

capacity will occupy only a portion of his time, he contemplates devoting the remainder of it to other engineering and mechanical matters and to looking after his private interests.

Henry P. Kraft, vice-president and treasurer, who has been associated with the Schrader company for the past thirty-nine years, succeeds Mr. Schweinert as president of the company.

This firm has been in business since 1844, and in addition to the manufacture of diving apparatus of all kinds, is one of the largest manufacturers of automobile accessories.

Removing Carbon Scientifically—A Cleaner, Cheaper Way.

Carbon has long been one of the main causes of trouble to motorists. Its accumulation is unavoidable and its removal has always been expensive—or a dirty, troublesome job if the car owner did it himself by the old-fashioned "scraping" method.

To meet the steadily increasing demand for something which will remove these trouble-making deposits, over two years were spent in developing Motor-Kleen, a scientific preparation of harmless oils, free from acids, alkalies or ether, and guaranteed by the manufacturer not to injure the

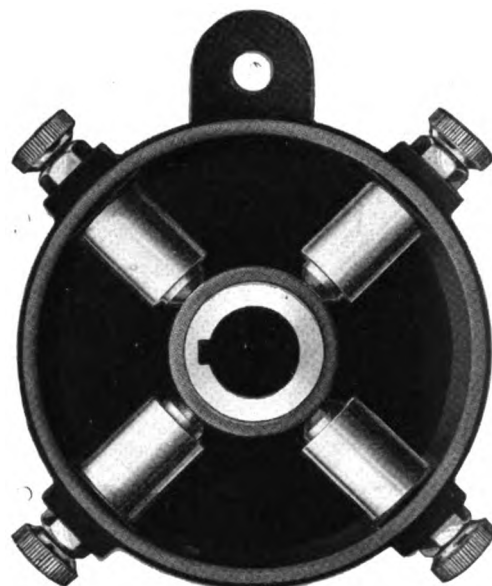
WHAT Do You Get For Your Money?

You Buy a Car for Service and Comfort
—Tires for Mileage and Dependability

When You Buy A

DALECO
Trade Mark Registered
TIMER

You Buy
**Guaranteed Timer Service
at 50 Cents Per Year**



The DALECO Guarantee

is not merely a series of high sounding phrases—it is a contract to insure the buyer perfect timer service for two years from the date of purchase and thereafter at 50 cents per year, on any Ford motor regardless of mileage or character of service.

We could not offer or maintain such a guarantee were the DALECO Timer not mechanically and electrically right.

Just examine a DALECO Timer—Note its Design, Material and you will readily see why we and the timer both make good.

Manufactured by
DALE MANUFACTURING CO.
1323 Michigan Ave.
CHICAGO, ILLINOIS

Sales Department
THE ZINKE COMPANY
1329 Michigan Ave.
CHICAGO, ILLINOIS

engine or interfere with the lubrication.

Sprayed in through the spark-plug vents, Motor-Kleen is said to enter the pores of the carbon, forming a gas by uniting with the oxygen in the air.

Upon ignition, this gas burns, turning the carbon into a powder that is quickly swept



Motor-Kleen Keeps Engine Free From Carbon.

out through the exhaust. This powder is stated to be so finely pulverized that it cannot lodge on valve seats or manifold and leaves the combustion chambers perfectly clean.

In addition to removing accumulated carbon deposits, the manufacturer of Motor-Kleen states that, by using it every 700 to 1,000 miles, motorists will be able to effectually keep their engines free from carbon, assuring full power from every cylinder and in this way lengthening the life of the engine.

Further details may be had by writing Motor-Kleen Corp., Sales Dept. 5, Long Island City, N. Y.

Neptune Distilled Water Means Purity and Profits.

Distilled water is used in the storage batteries of all cars and all battery guarantees are conditioned upon its use, because water for storage batteries should be absolutely pure. Neptune distilled water is pure. It is entirely free from any mineral or organic matter in suspension or solution which might combine with the plate elements to their detriment.

Use of Neptune distilled water assures long life to batteries and thus it means satisfied customers.

When a garageman or dealer makes a small profit he's happy, but when he makes a large profit he's more than happy. Those who handle Neptune distilled water for storage batteries will be more than happy, as not only the water can be sold to customers at a fine profit, but the bottles and case have a real value anywhere in the United States, as money will be refunded if they are returned to the manufacturers. Hinckley & Schmitt, Inc.

Write to Hinckley & Schmitt, Inc., 420 W. Ontario street, Chicago, for prices and attractive dealer proposition.

"Standard Systems" Stop the Leaks—Turn Losses Into Profits

He "just forgot" to make the charge—that was all—but it meant a loss of several dollars to the Richmond garage. It wasn't the first time that his mechanics had "forgotten" to make a charge for materials, and Richmond was beginning to worry over the small leaks and losses which were steadily cutting down the profits of his business.

Of course, the thing Richmond needed was a real "sure-fire" record system, by means of which both his sales and service departments could simply and easily keep an absolutely reliable and accurate record of each transaction.

And, having arrived at a decision as to what his needs were, he wasn't long in finding the means to supply them—in a "Standard" system. Many garages and service stations, throughout the United States have found a solution for their service and sales record problems by using a "Standard" system.

For the sales department, there is a set of, triplicate forms. One of these is the original copy, which goes to the bookkeeper and which shows the exact quantity and nature of the goods sold, as well as indicating the kind of transaction—whether it is a charge, C. O. D., cash, received on account, or cash paid out—and the exact amount of business produced by various individuals. It enables one to keep a running inventory of stock and may be used to figure daily profits or to compute a statement of the day's business. All sales slips are consecutively numbered and each carbon copy bears the same number as the original.

The second copy is the customer's receipt or invoice, and the third sheet is the "auditing copy," which remains in the register under lock and key and can be referred to if the original copy is lost, or in the case of errors or disputes. This copy serves as a check against the original copy, and the register can be furnished with or without this "locked-in" copy.

Triplicate forms are also recommended for the service department. One of these, or the original copy, is sent to the parts department with the second copy until the job is finished. It then goes to the bookkeeper. The clerk in the parts department enters the items given the workman on the "material report" on the back of the original copy.

The original copy shows the exact quantity and nature of the parts, repairs or labor furnished, and indicates the kind of transaction—whether cash or charge. It is signed by the customer, the signature showing on all copies. All sales slips are consecutively numbered and each of the carbon copies bears the same number as the original.

The second copy is the "customer's receipt" or invoice. The clerk in the parts department, by placing carbon between the original copy and the second copy, enters the material given the workman on the back

of the second copy. When the job is completed, this copy is sent to the office and given to the customer as his invoice.

The third copy is the "shop copy" which is put in a folder and tied to the car. It furnishes instructions to the shop foreman as to what must be done to the car. The workman takes this third copy with him as authority for securing material from the parts department.

If the system which has been outlined does not meet your particular needs, the service department of the Standard Register Co., 301 Albany St., Dayton, Ohio, will design a form for you, large or small, and having as many copies as the nature of your business may require, with or without such features as the cash drawer and locked-in roll.

"Standard" systems, being very flexible, are equally adaptable to either the large or small garage or service station—whether the work is departmentalized and handled by clerks or whether the proprietor or service man must make the record of a transaction.

The patented pin wheel feature of the "Standard Kant Slip" manifolding register is especially valuable, since it is said to absolutely prevent slipping of sheets and insure perfect alignment of all copies.

Full particulars regarding Standard registers and "Standard" systems may be obtained upon request from the Standard Register Co., at the address which has been given.

You Sell Ford Owner Accident Insurance with a Steerite.

"It's a simple little device—quickly and easily attached. But oh, Boy! What a difference when a Steerite is once in place on your Ford!"

And here are the reasons why that dealer could make such a statement to his customer:

The Steerite safety device is automatic in action and designed to compel the car to take a straight course—and hold it—regardless of holes and obstructions, rough roads or sand. By holding the car steady,



Steerite Holds Car In Straight Course.

accidents are prevented in case the steering apparatus breaks and accidents due to buckling of the wheels when striking obstructions are avoided.

It permits full turning radius of the car without straining the steering apparatus, and also prevents the radius rod from be-



Your customers will find a new pleasure and comfort in driving their Fords when they have a straight track ahead of them for the wheels to follow.

The "Steerite", attached to the tie rod and axle, automatically controls the steering apparatus. It prevents accidents in case the steering apparatus breaks, acts as a shock absorber on front axle, and relieves constant strain to keep the car on "a straight and narrow path."

The "Steerite" allows full turning radius of the car, and without straining the steering apparatus. Takes up side motion of front wheels, thus giving about 20 per cent more wear to tires. Keeps radius rods from bending.

Seventy-five per cent of accidents to light cars are caused by steering gear control. You can offer your customers a real insurance against these accidents in "Steerite."

A few desirable territories are still open for dealers and agents. Every Ford owner is a prospect for this all-year-round seller.

Write
for
details

STEERITE STABILIZER CO.

3rd and Walnut Sts.

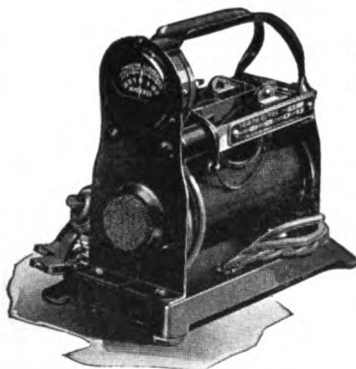
243 Insurance Exchange Bldg.

Philadelphia, Pa.

Retails
\$3.50

The Sterling

PORTABLE RECTIFIER



against over charging. Dash connection, if desired. Simply insert plug in dash to charge.

INDIVIDUAL battery charging at last practical and inexpensive. Mechanism simple and durable. Operation certain. Improved vibrating reed type. Wear and sparking eliminated by the large surface of contacts. One thumb-screw does all the adjusting. Not necessary to distinguish positive and negative posts of battery. Charges with either lead wire attached to positive post. Higher charging rate at lower current cost. Charges nearly exhausted storage battery over night, and right in the car. Automatically tapering charge safeguards

Initial charging rate 6-volt battery, either 5 or 10 amperes.
Price complete\$16.00
West of Rocky Mountains, \$17.00

OTHER STERLING PRODUCTS—

Dash and Pocket Ammeters and Voltmeters,
High Rate Cell Tester, Magneto-Meter,
Polarity Indicator and Spring Oilier.

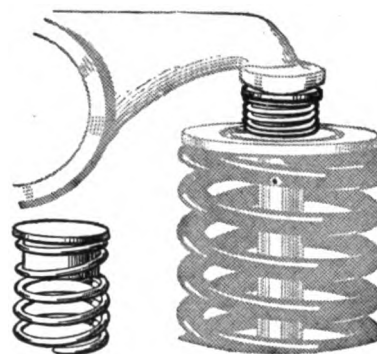
Ask your jobber or write direct for Bulletin

THE STERLING MFG. CO.

2849 Prospect Ave.

Cleveland, Ohio

Over Two Million Sterling Instruments in use today.



LANE ROCKER ARM SILENCERS

LIST PRICE
\$2.00
PER SET

For Overhead Valves

Here is a fast selling device which every owner of an overhead valve car needs. It eliminates the tapping noises of the rocker arm. The *spring* takes up all lost motion in the moving parts between the valve stem and the cam shaft. The indestructible *fibre pad* contained in the *brass cap* eliminates the noise caused by the tapping of the rocker arm on the valve stem of the motor.

Easy to attach. Once installed, no further adjustment necessary. Write for discounts asking for circular 15.

NATIONAL EQUIPMENT CO.

Commercial Trust Building
Philadelphia, Pa.

ing bent when striking a curb or objects on the road.

From the standpoint of a comfort-adding feature, the Steerite has much to offer. It acts as a shock absorber on the front axle and relieves the driver of the constant effort and strain of trying to keep the car in a straight course, as well as enabling him to be more watchful of surroundings because the car is self-steering.

The Steerite is also an economical feature as, through the absorption of shocks, it adds life to the ball and socket joints and bushings and is said to give about 20 per cent more wear to the tires by taking up the side motion of front wheels.

There is no disfigurement to the car when the Steerite is attached, and it is guaranteed to give perfect service during the entire life of the car. Only 10 or 15 minutes are required for attaching it.

You can secure further information concerning this handy device, which costs little and saves much, by writing to the Steerite Stabilizer Co., 243 Insurance Bldg., Philadelphia, Pa. Ask, also, for details of the interesting dealer helps which this company is prepared to furnish those interested.

It Gives Long Life and Service Because It's a Hete-Pruf.

When the Leeseberg Machine & Mfg. Co. designed its "Hete-Pruf" piston ring, three points were borne in mind as being fundamental facts upon which to base the construction of a piston ring purposed to give complete satisfaction. These three points were:

First, that it is heat and not wear that spoils a piston ring.

Second, that compression leaks are at the side of the ring and not through the joint.

Third, that less than $\frac{1}{2}$ of 1 per cent of the compression leaks are ever through the joint of a properly fitted ring.

By means of a patent heat-treating process, these piston rings have been heat-formed to true circles, this process making them proof against any heat action up to 700 degrees Fahrenheit or 300 degrees hotter than they will ever get in a motor-car engine.

Thus, declares the manufacturer, a ring that is a perfect circle has been produced—having a correct wall pressure uniformly distributed throughout its length—and being a soft surface, quick-seating ring that will not cut or score the cylinder wall under any circumstances.

Because it is heat-proof, this ring is said to be unusually long-lived, and it is guaranteed to retain its true circular form, uniform wall pressure and tension throughout the life of the motor.

Having produced these rings for leading car and engine manufacturers, for use in special jobs, with uniform success for the past three years, the manufacturer feels that he can now offer them to the trade

with the assurance that the Hete-Pruf steel blue piston ring is one which will afford unqualified and lasting service.

Circular and prices will be forwarded upon request by the company's sales department, The Zinke Co., 1329 Michigan Ave., Chicago.

New Refrigerator Basket Delights Tourists and Picnickers.

Motor tourists and family picnickers are going to welcome the new "Everybody's Hawkeye basket refrigerator."

It is built like a high-class refrigerator. The outside is rattan. Next to this there are several layers of the best insulating material, and the basket is lined with tin



"Everybody's Hawkeye Basket Refrigerator."

plate, with removable ice compartment. A small piece of ice keeps the contents cool for 24 hours.

This basket is 20 ins. long, 12 ins. wide and 10 ins. deep—light, neat, and durable, and shaped so that it can be placed under the robe rail in the tonneau of a car where it takes up little room and is within easy reach.

As it has an ice compartment which will hold ice to keep food cold, this feature will appeal especially to families who must take along milk and keep it sweet and sanitary for the baby.

This basket refrigerator is dust and dirt-proof and keeps out insects. Its popular price has been made possible, on this model only, by the large manufacturing facilities of the Burlington Basket Co., 1070 Hawkeye Bldg., Burlington, Ia.

Compton's Spring Oiler Saves Breakage by Proper Lubrication.

All garagemen are familiar with the difficulties experienced by the car-owner customers in keeping automobile springs in good condition, no matter what kind of a car they may drive.

The several layers of the steel leaves, of which automobile springs consist, must be free to slide on each other, as it is only in this way that they can carry the load of the car safely and produce the easy rid-

ing which they are intended to give to the car occupants.

When springs are rusted together or so badly lubricated that the leaves cannot move on each other, the springs are forced to carry the load of the car as a beam, and this is frequently found to be the cause of uncomfortable riding and breaking of springs.

If there's wheezing and squeaking, the springs are rusty and rusty springs are liable to breakage and, of course, broken springs mean trouble and expense. It is essential, therefore, to provide lubrication which will give a free and easy movement of the spring leaves at all times. And that's where the Compton spring oiler comes in.

The Compton spring oiler is designed to feed the oil to the springs in such a manner that it will really penetrate between the leaves and not just run off on the surface. Simply adding oil occasionally keeps the springs in excellent condition.

Made of metal and a special felt, there is nothing about a Compton spring oiler to get out of order. Between two sections of felt there is an ample oil chamber which feeds the oil to the springs through the felt in both directions. This oil chamber is easily filled through the oil hole which is closed and protected by a tight cover forming part of the oiler.

It takes but a few moments to attach a Compton spring oiler, and it is simply slipped around the spring, two screws inserted and tightened, and the oiler pushed along the spring until it finds its bearing and is ready for action. No drilling of holes or change of parts is necessary, the oiler being attached to the springs by its own fasteners and interfering with nothing—but it does thoroughly lubricate the springs, it is declared.

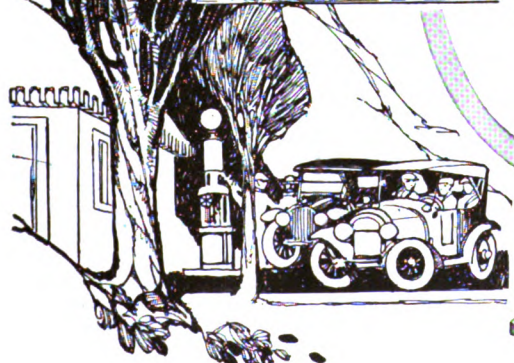
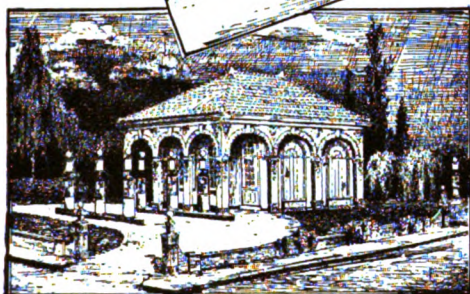
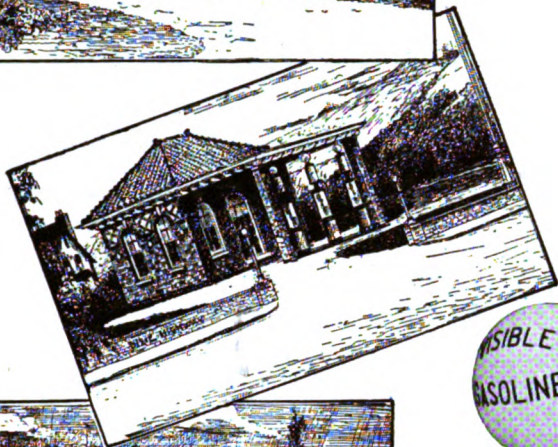
The manufacturer has a most attractive proposition for wholesale distributors able to carry their own stock. Write Compton's Spring Oiler Co., Box 25, 29 Broadway, New York, N. Y., for particulars.

Paragraph.

WILLIAM M. REYNOLDS has joined the sales staff of the Burgess-Norton Mfg. Co., having given up his job as a manufacturers' representative, and will confine his efforts exclusively to traveling in the interests of the Burgess-Norton Mfg. Co.

In connection with two other road men, now spending the greater part of their time as specialty salesmen assisting the jobbers, and with the manufacturers' representative, A. H. Deveney, covering the southern and southeastern territory, B-N piston pins manufactured by this concern should show a considerable increase in sales during the next six months.

The Burgess-Norton policy, adopted at the beginning of this year, is to assist its jobbing accounts in every way that is possible in the sale of this well-known replacement part.



The BEST IDEAS in OIL STATION BUILDING

NOW, the individual or oil company contemplating the building of an Oil Station can secure from ONE SOURCE complete PLANS AND SPECIFICATIONS of a modern, up-to-date station exactly suited to their needs and location, ready to turn over to the builder or contractor—

Also the famous and widely used

American *Visible Curb Pump*

together with the Oil Equipment and everything needed to complete the station ready for operation.

The plans combine the MOST SCIENTIFIC construction with the BEST and MOST ATTRACTIVE designs, including complete details for economical and efficient arrangement of interior fixtures.

We have issued a booklet illustrating a number of designs and explaining how a THOUSAND COMBINATIONS of buildings, interiors and ground plans can be made from our plans.

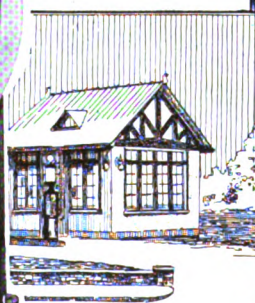
Ask for Booklet 61-F

The American Oil Pump *and Tank Company*

1161 FINDLAY ST.

CINCINNATI, OHIO.

IMPORTANT!
Be sure and
specify booklet
by number.



Electricity and the Vulcanizing Shop

Minnesota Service Station Finds Electric Equipment Permits Cleaner Shop and One Which Is Pleasanter During Hot Weather—Manager Says Shop Is Operated on Principle that "What Is Worth Doing at All Is Worth Doing Well"

The Progressive Tire Service Station, at 27th Ave. and Lake St., Minneapolis, Minn., is said by those who ought to know, to be the best-equipped tire repairshop in the "Twin Cities." Manager Duncan says the entire thing was laid out from start to finish on the basis that what is worth doing at all is worth doing well.

"Yes, we got the all the way through," he said, "but it naturally follows that we are now in a position work and, of course, to do the very best that is the important thing."

The Progressive Tire Service Station is equipped throughout with tire repair equipment manufactured by the Progressive Shoe Machinery Co., of Minneapolis. This plant originated for the shoe repairman the line of machines that lifted those people from the "cobbler" class into the ranks of real business men; and they are now turning their attention to the tire repairmen with the same purpose in mind.

Duncan is an old timer at the vulcanizing business, having operated a shop for 13 years. During that time he has used different makes of steam vulcanizers, and he is so enthusiastic about the Progressive electric vulcanizer that he says he is permanently sold on the idea of vulcanizing tires and tubes by electricity.

"There is no question but that I have a neater and cleaner looking shop, and one that is pleasant to work in in the hottest weather," said he, "but, from the standpoint of actual performance, I can easily see that electricity has worked its way into the vulcanizing game the same as in so many other lines."

The illustration shows part of the equipment of this model station, which will interest operators of other service stations.

The three-cavity casing vulcanizer is also equipped with a 24-inch tube plate, and the tube plate or any one cavity can be brought up to vulcanizing heat without heating the rest of the outfit. Of course, inasmuch as no steam is in any way connected to this plant, there are no pipes to freeze in winter and no boiler to make the shop hot in summer.

The piece of equipment in the foreground of the illustration is the buffer

bench combination outfit, in which a number of items of shop equipment are combined into one unit.

Two of the parts to this outfit are the tread puller and the fabric skiver. These are two machines that are used in making boots and reliners from old casings.



Said to Be Best Equipped Tire Repair Shop in "Twin Cities."

Duncan says they do a great deal of work of this sort, not only for their own use but for other shops and garages. He calls regularly on the other stations in the city, and has contracted for making their boots and reliners, as well as doing the vulcanizing for several garages that do not have their own plants and which are delighted to have the vulcanizing service done for them as Duncan does it.

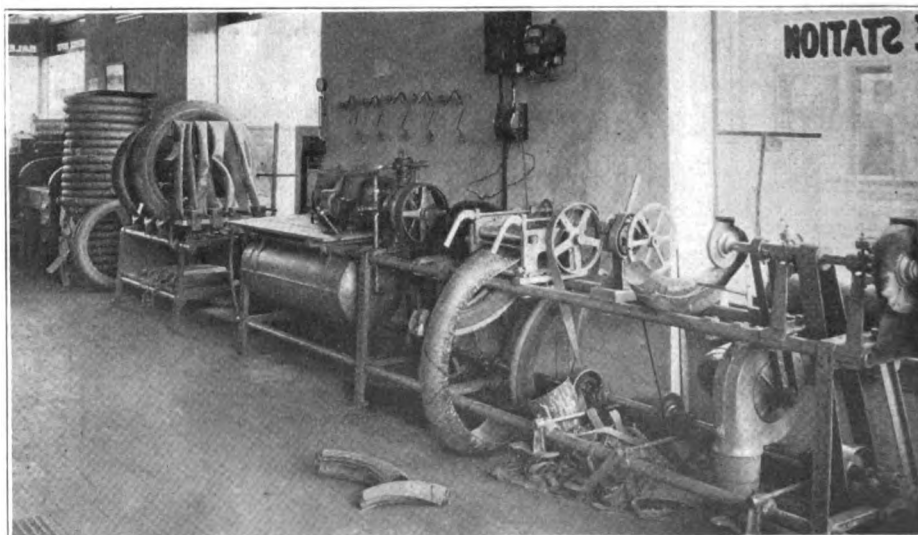
This idea of buying ready-made boots is gone for good, according to Duncan. He tells the writer that, on one occasion, three men made 180 boots in five hours—80 of

them cord and 100 fabric. This included all the operations—removing the beads, removing the tread, cutting up to size and skiving the four edges.

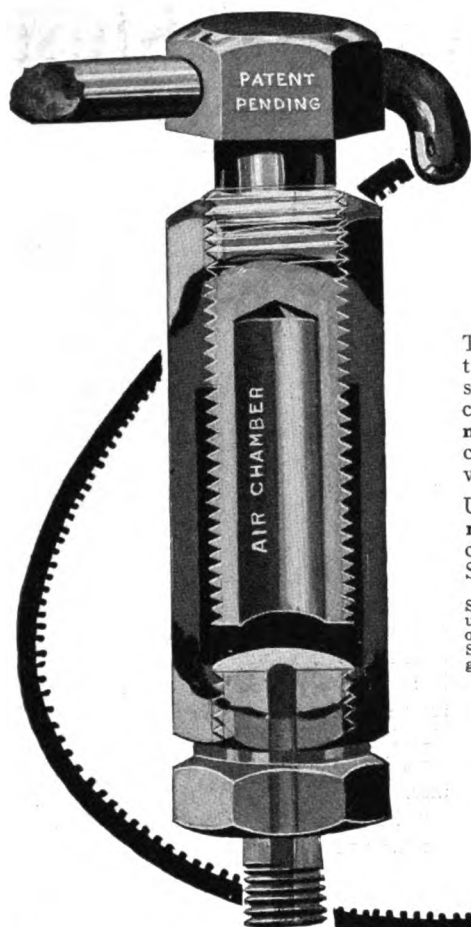
The Progressive Tire Service Station handles a well-known make of tires to supplement its repairing. The tire company arranged for supplying a series of sales letters on special letterheads when the station opened, and these were mailed out to automobile owners in the city.

Free air is provided outside the station, and Duncan says he makes it a point to step out to a car when anyone drives up for air. This gives him an opportunity to assist in filling the tires and also enables him to inspect them and make suggestions about needed repairs. One cannot visit this Minneapolis shop without being impressed with the fact that it is a real place of business and that it is getting the business proves that it is being managed along the right lines. Results are what count.

Those who are interested in learning more about the electric vulcanizer, buffer bench equipment, etc., which have been of so much assistance in this progressive tire service station, should write for catalog 1-B which the Progressive Shoe Machinery Co., 3116-36 Snelling Ave., S., Minneapolis, Minn., will send to anyone requesting it.



Some of the Equipment Which Is Used in the Model Tire Service Station.



It's a Winner

THE STRICKLER HIGH PRESSURE GREASE AND OIL GUN

**MAKES GOOD
BECAUSE IT'S MADE RIGHT**

The Strickler wins where others fail for the reason that it can't burst through back pressure. Look at the illustration of the Strickler and see why. This High Pressure grease and oil gun is made of solid, cold rolled steel, machined out and threaded from the bar stock. It's **not** cast. The pitch of threads gives positive, steady feed, and air chamber acts as cushion to steadily compress the grease and force it, without strain, where it belongs.

Under pressure of the Strickler, dust, dirt, corrosion and hard grease **must** go. Used everywhere as an auxiliary to lubricating systems costing great deal more. Price of gun \$3.50. Extra nozzles 80 cents. Specify name, date and model of car.

Series of special male and female nozzles make it possible to use Strickler High Pressure guns on any car. Manufacturers of Franklin, Pierce Arrow, and many others use and recommend Strickler High Pressure grease and oil guns. Special sets for garages, for use wherever grease cups are used, \$18.00 with gun.

Get complete particulars at once.

ADKINS, YOUNG & ALLEN CO.

561 Washington Blvd.
Chicago, Ill.



"I am very much pleased with the AMERICAN GARAGE and AUTO DEALER. I got one idea from you that will just double my sales in 1922."

WM. J. BRAUN,
Braun Vulcanizing Co.
Wahpeton, N. Dakota.

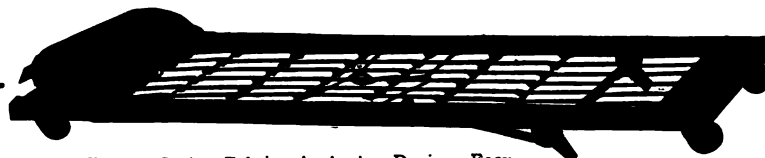
KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by
THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.
Canadian Branch Factory at Woodstock, Ont.

Foster

Auto Repair Creeper
METAL CONSTRUCTION



Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

FOSTER BROS. MFG. CO., UTICA, N. Y., U. S. A.

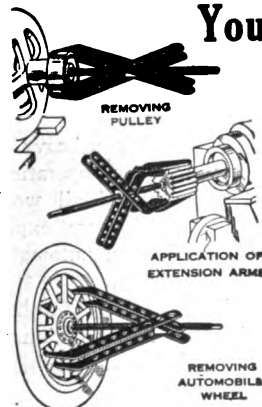
\$5.00

Ask for the name of the Foster Distributor in your territory.

DIRECT REPRESENTATIVES

Eastern and Southern States: Asch & Co., 16-24 W. 61st St., New York, N. Y. For the Mid-West: Jousop & Thompson, 1421 S. Michigan Ave., Chicago, Ill. Pacific Coast & Inter-mountain Territory: McDonald & Linforth, 739 Call Bldg., San Francisco, Cal.

You Need One or Both These Gear and Wheel Pullers



The "LITTLE GIANT"

pulls any gear, wheel or pulley—anywhere—in a jiffy. Built on the only correct principle—produces maximum efficiency with minimum effort. Can't twist off or let go. Made of best grade drop forge steel. Adjustable up to 13" diameter. Price complete with extension arms \$12. Satisfaction guaranteed or money refunded. Order one today or write for data.

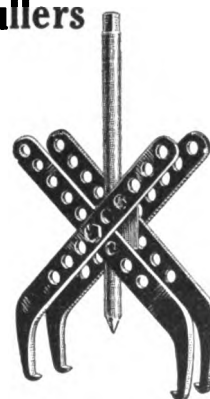
"THE HARDER THE PULL—THE TIGHTER THE GRIP"

Write for dealers' discounts and literature

Premier Electric Co., 3802 Ravenswood Ave., Chicago

"BIG BUSTER"

This heavy duty puller is designed to cover a range of work upward from where the "LITTLE GIANT" and other tools leave off. Weighs 100 lbs.—open adjustment 40". Pulls heavy motor truck and car wheels, ship and aeroplane propellers, heavy fly and gear wheels, transmissions, etc., easily. Can't slip off work—no arm locks required. Price complete with wrench and handle, \$50. Where you have a job no other puller will touch you need a "Big Buster."



Equipment That Promotes Business

Now that the Big Summer Business Is Opening Every Garageman Is Looking for Equipment That Will Help Him to Get His Share of the Profits—This Garageman Recognized the Opportunities in "American Super Service" Equipment

The little Ohio city seemed smiling a welcome to Gaines as he walked quickly up the street on his way from the train, and his mood was quite in keeping with the serenity of the day and the brisk and contented aspect of the town.

Yes, he had had a very satisfactory trip, he thought, as he strode along—mighty satisfactory in many ways. Have to tell the boys about the little jaunt at Cincinnati. They'd be "pleased as punch" over that transaction!

The Gaines garage stood at the intersection of two of the busiest streets in B—, and Gaines never failed to experience a renewed satisfaction over his own foresight in having bought on that location a few years back. He smiled again as he came nearer—Tom surely had the place looking fit this morning.

"Hello, boys" greeted Gaines as he entered the garage and two or three of the workmen came forward to greet him. "How's business?"

"Good? Well, that's fine. I'll say I had luck." in answer to his foreman's question. "Fine as silk, all the way through. Put through a better deal with Standish than I expected even. But, say, boys I want to tell you about a little job I did while in Cincinnati that I hadn't figured on when I went up there.

"The day I went in to see Standish, he was just getting ready to leave the store—said he had to go to the American Oil Pump & Tank Co.'s factory out on Findlay and Dalton Sts., on some business and suggested that I hop in and go along as we could talk business on the way out. You know Standish! Always trying to put through as many jobs at one time as he can. Bet that fellow never wasted a whole minute in his life.

"Of course, I went along. Nothing else to do. We had a fine little spin out to the factory and I hadn't any more than sighted the place than I began to 'sit up and take notice.' Say, boys, that's some place. I didn't have time to go all through the factory, but I did get a look in at some of the things they are doing out there. They manufacture the 'super service' gasoline and oil storage systems.

"I reckon you couldn't name a place that would use oil or gasoline that they didn't have an outfit to suit. When you take a look at one of those outfits for handling oils and gasoline, you begin to understand why some of these trade papers talk so much about keeping your place neat

and clean—storing your oil and gasoline in those 'super-service' outfits would mean half the job done.

"Well, I had a look at all of them, and picked up some good ideas about a lot of things as I went along. There was a visible curb pump out there that I liked especially. In fact, I liked it so well that I ordered one for our place. It's going to look good out in front there—and you know, boys, we want our share of the trade the Chautauqua is going to bring to town this season, to say nothing of the tourists who'll soon be rolling through.

"People do like to see what they're buying, and this pump has a visible glass cylinder that is plainly graduated for one two, three, four and five gallons, and gives an accurate and reliable check as to the

cleaning of the glass cylinder on the inside when necessary without disturbing electrical fixtures and connections.

"There's a 10-foot length of 1-inch metal lined cotton jacket hose with couplings and a nozzle attached, that allows the gasoline to quickly drain into the automobile tank. It has a heavy and substantial throttle valve to regulate the flow.

"The pump itself is a double-acting, continuous flow one-gallon measuring pump, and pumps gasoline in a constant stream on both the up and down strokes of the piston. Only $4\frac{1}{4}$ turns of the handle are required to pump one gallon into the container ($2\frac{1}{2}$ on the up stroke and $2\frac{1}{4}$ on the down stroke). All valves are accessible, which is a feature of 'American' pumps. This reduces the time and expense involved in cleaning to a minimum, as they can be removed, cleaned and replaced in a few minutes.

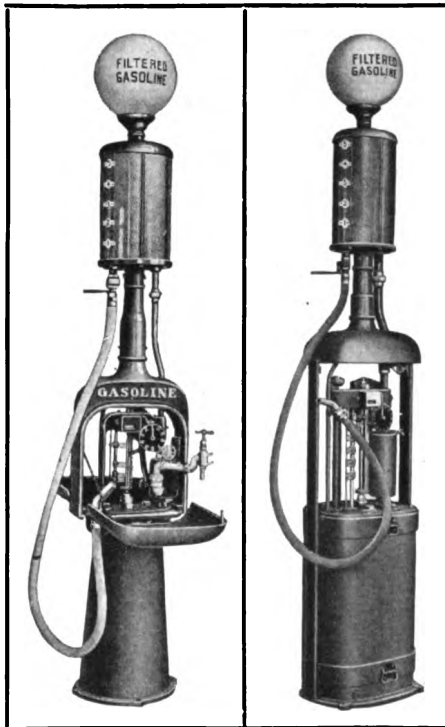
"The pump is strong and durable, being constructed entirely of metal, and the cylinder and stuffing box are made of high-grade brass. The valves are made of special composition metal, hand ground, and carefully tested and inspected.

"It takes only 50 to 60 seconds to fill and drain the container. The quantity stops are placed on a threaded rod and are set and adjusted for pumping accurately 1, 2, 3, 4, or 5 gallons into the container. The adjustment of the quantity stops governs entirely the correctness of the measure, so that the pump alone does the measuring. The graduations on the container act only as a check. This is a distinct advantage, as it makes it unnecessary to gage by the eye whether the gasoline is level with the graduations and thus risk pumping above or below the mark.

"There is a discharge register, with a large clock dial, which shows the amount of gasoline pumped to ten gallons and then repeats. An efficient locking device prevents any movement of the handle when the pump is not in operation, the use of this lock allowing the cabinet doors to be left open during business hours without danger to the pump through tampering or meddling.

"The pump is enclosed in a heavy, cast-iron cabinet, the two doors operating on hinges, so that when closed all working parts are fully protected from exposure. The cabinet is securely and automatically locked by closing the doors.

"The cabinet is attractively finished in red enamel and lettered in aluminum or-

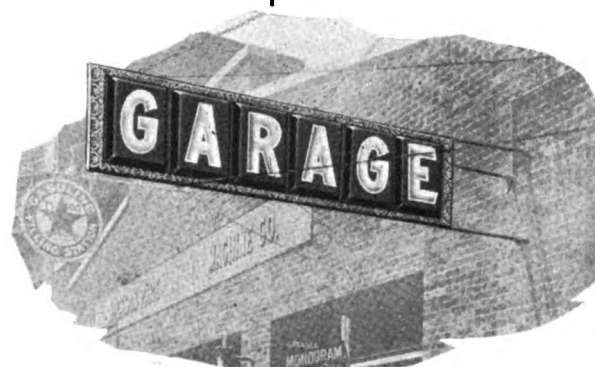


Two Types of "American Super-Service" Visible Curb Pumps.

accuracy and amount of gasoline delivered. The graduations—aluminum figures placed on a rod—are exact and dependable as each cylinder is tested individually. A heavy, expanded metal screen is placed around the outside of the cylinder, and affords ample protection.

"The screen is removable, allowing the outside of the glass cylinder to be cleaned when necessary. The dome of the container is also removable, permitting the

FEDERAL ELECTRIC SIGN



THIS beautiful Porcelain Enameled Steel Sign finished in blue and white enamel. Every letter in the word "Garage" is embossed so that the letters glisten in the day time and sparkle at night. The bulbs in the letters of the word "Garage" make the sign very bright.

It will last indefinitely—an occasional wiping with a damp cloth keeps it practically like new. Costs only a few cents a day for electricity. Remember, that this is called the Porcelain Enameled Steel Lamp Letter Sign.

Reach Down the Street For Your Business

That is the only way you can get a big share of it—NOW. You must keep everlastingly asking the public to trade with you.

And, the most forceful, economical way to advertise your business and location to the hundreds of people who pass your garage, is to use a Federal Electric Sign, such as shown on this page.

12 MONTHS TO PAY

A small payment brings you either one of these signs, such as you may select—It pays for itself, while you pay for the sign.

Send coupon for full information and prices as well as sketch showing how your Federal Electric Sign will look. Do it now—no obligation—gain a step on competition.

THE sign shown above is much the same as the sign shown on the left with the exception that the letters are made of raised snow white glass and the bulbs in the sign are behind each letter. Beautiful blue and white Porcelain Enameled Steel background. Easily read from a distance. Costs only a few cents a day for electricity.

Remember, this is a Federal Porcelain Silveray Electric Sign.

SEND COUPON NOW

FEDERAL ELECTRIC COMPANY,
8700 So. State St., Chicago, Illinois.

Please send me full information, price and free sketch of Federal Electric Sign for my business.
☐ Porcelain Enameled Steel Sign. ☐ Porcelain Silveray Sign.

(Place "X" before sign desired.) Explain your 12 Months to Pay Plan. No obligation.

Name City State

Street and No. Business

Store Frontage No. of Floors

Federal Electric Signs are the cause of a busy street—not the result.

(A & A D-5)

dinarily. Of course, though, our town's regulations won't permit us to use a red curb pump, but I was assured that I could have the pump painted any color I desired, except white, without any extra charge.

"All gasoline pumped is automatically and correctly registered by the meter with which the 'American' pumps are equipped, no matter how small the quantity may be. It registers up to 100,000 gallons and then repeats, making a continuous record. The quantity indications are in plain, large figures, and can be read at a glance. The meter is strongly constructed and has no glass parts. It cannot be turned back or manipulated. It is sealed in position and cannot be removed without breaking the seal.

"The filter has ample capacity and will remove all water, dirt, or other impurities, thus preventing carburetor troubles and assuring the highest efficiency of the en-

gine. It is so constructed that the screens can be quickly cleaned or replaced. The water and foreign matter collects in the bottom of the filter and may be removed by opening the small petcock in the top and pumping. A swinging can nozzle for filling cans and other containers can be attached, if desired.

"The electric light fixture, all wired and ready for connecting, consists of the globe holder—with necessary wiring, unilets and lamp sockets. A large ball globe which is lettered 'Visible Gasoline' is included and makes a good looking advertisement, both day and night. Of course, I could have gotten the pump without the light fixtures but, since we have the electric connections, I wanted them on. I think that pump is going to be as good an advertisement as we ever had."

"I'll say it will," agreed his foreman.

The tanks furnished with "American"

pumps are of steel and can be had in any capacity from one to 20 barrels and 12 or 14-gage thickness. Heavier and larger tanks can be furnished if desired. The seams are welded, so that there is no danger of the tank springing a leak.

Pumps are equipped complete with filter, meter, discharge register and dial, locking device, electric light fixture and visible container with hose and nozzle; also storage tank and tank fittings, consisting of double accessible foot valve, vented fill pipe with lock, suction pipe, gage stick, litharge and glycerine for use on suction line, as well as directions for installing.

Those interested in obtaining further details regarding "American" gasoline and lubricating oil storage outfits should write the American Oil Pump and Tank Co., 1161 Findlay St., Cincinnati, Ohio, for descriptive literature on "super service" gasoline and oil storage systems.

Up-to-the-Minute Garage Equipment

Cylinder Boring Easily and Quickly Done with "The York."

There are many reasons why garagemen and repairmen find "The York" portable cylinder-boring machines particularly advantageous in their shops.

For instance, "The York" may be operated either by hand or by power, the power drive which is furnished with every machine being as easily attached as the hand crank. This power drive is operated by any electric drill, $\frac{3}{8}$ -inch capacity and up, or it may be operated by an individual $\frac{1}{4}$ -horsepower motor. A special holder for any electric drill or individual motor bracket will be furnished at a small additional cost.

"The York" has the rigidity and sturdiness of a large machine tool and, at the same time, has the compactness which is so essential for a portable boring machine designed for boring the cylinder blocks of

nearly all the open-head motors in the chassis. It will bore any motor block from $2\frac{1}{2}$ inches to $5\frac{1}{16}$ inches.

Simplicity of operation is another feature of this machine. There is no twisty, jerky, stop-and-start, hard turning—the turning is smooth, easy and continuous. Thus the strain caused by operating with a pipe wrench from the top of the boring bar is eliminated.

All cutters furnished with "The York" cylinder boring machine are ground by the new "York" special process. These cutters are a special design, and have a radius lead ground on them. Thus, they are self-centering. 0.031-inch or 0.001-inch can be taken in one cut and a perfectly smooth surface, round and true, is left, so that a perfect micrometer fit is secured.

The cutters are expanded uniformly by turning the set screw in the adjusting cone, and it is not necessary to remove the cutter head from the boring bar.

The boring bar is rigidly supported throughout the 18 inches of its length, and the bore must be round, straight up and down and true without taper.

A sectional base permits the accurate centering of the machine under any conditions, and the cut may be examined, a second cut taken or a piston tried, without disturbing the centering.

For descriptive literature and prices, address the Winterknight Equipment Co., 1328 Race St., Philadelphia, Pa.

Work the Safe Way—With a Turner Blow Torch.

Another splendid line of torches has been added to its regular line of blow torches by the Turner Brass Works—and, because the manufacturer feels that in this new line

of torches he has embodied perfection of design, material and construction, it is known as the "Turner Master Line."

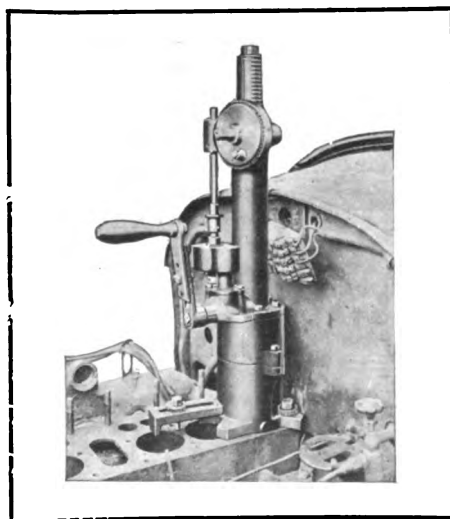
These torches are made for burning either gasoline or kerosene, without changing parts.

There is only one opening in the tank on the Turner "Master" line, and this is on top where there is no fuel, as leaks cause fires, explosions, loss of lives and damage to property.

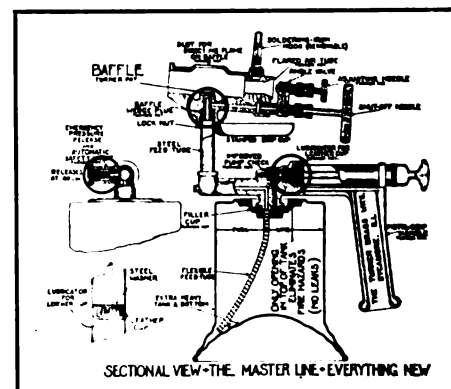
The Turner torch is equipped with a safety valve, which is set at 40 pounds and which automatically opens and closes at this pressure, thus making it impossible to get too much pressure and burst the tank. bulge the top or blow out the bottom and cause leaks.

A needle-valve air release which, when opened after the operator has completed his use of the torch, releases all pressure in the tank is an additional safety feature.

The baffle is the obstruction in the burner on which the flame is constantly applied, heating the fuel to a hot dry gas and in-



Simplicity of Operation a Feature of "York."



"Master" Torches Burn Gasoline or Kerosene.

Make Your Store the Most Talked of in Your Town

The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.

It is **not** given away.

It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

There is absolutely no other way by which you can secure this sign. It and every one of the epigrams are copyrighted. There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

Write today for full particulars. Learn all about the Big En-ar-co Boy and Slate Sign, the epigram service, and the other advertising helps we give our dealers. Be the first in your community to get started. Use the Coupon. Use it Now!

THE NATIONAL REFINING COMPANY

National Headquarters, O-731 National Bldg., Cleveland, Ohio
4 Modern Refineries : 93 Branches

THE NATIONAL REFINING COMPANY,

O-731 National Building, Cleveland, Ohio

Without obligation to me please send full detailed information regarding the En-ar-co "Boy and Slate" and Epigram Service, and other advertising helps.

Name.....

Address.....

City..... State.....

I now sell.....Oil.....



REPEAT ORDERS PUT THE CHIEF AUTO MIRROR OVER

Every dealer, jobber and car distributor who is selling this Quality Mirror has come back for more—so will you.

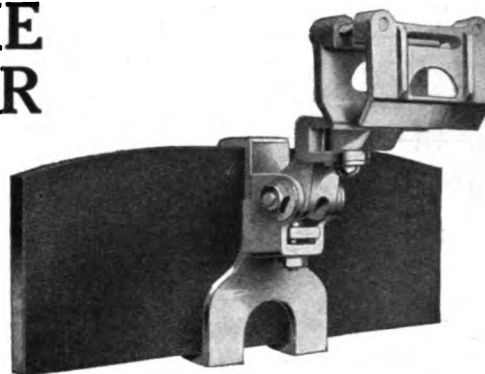
The Chief Auto Mirror stays sold on its merits. Carefully constructed and finished like a piece of jewelry, it sells on appearance as well as utility. The mirror is the finest quality French crystal with the silvering protected against the elements by a patented chemical process.



This trade mark protects the dealer against substitution and guarantees the Chief to the owner.

Chief Mirror brackets can be easily adjusted to any angle and stay put. Every bracket is interchangeable.

JOBBERs and DEALERs are enthusiastic over the sales possibilities of this wonderfully attractive line of mirrors. If you haven't received a copy of our catalogue write for it now. We will supply direct all dealers whose jobbers do not carry the line.



Model A—Style No. 1—Oval, 8 x 2 3/4"

Made especially to fit the center windshield frame of all touring and open cars. Faces the driver for rear or side views. Reversible with windshield open or closed or top up or down. The lock-clamp will fit any universal windshield frame, oval, round or square, and holds securely.

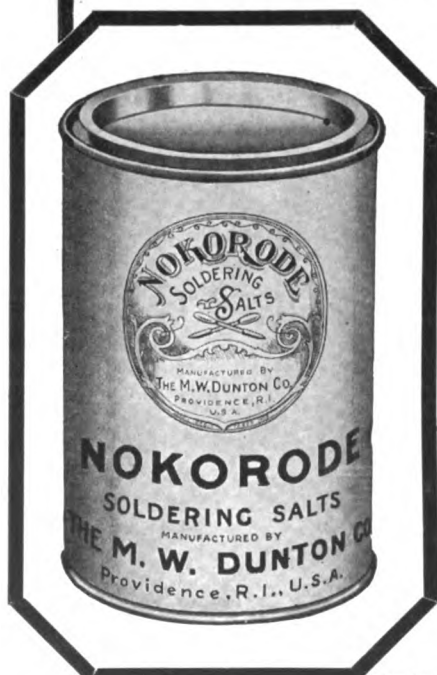
Price, \$5.00

BRITTON AUTO PRODUCTS CO., Inc.

118 West 63rd St.

New York City

NOKORODE versus ACID MEANS Satisfaction versus Corrosion



NOKORODE SOLDERING SALTS is as easily applied as acid, makes just as secure a bond and is absolutely harmless to both the work and the worker. It would be difficult to over-estimate the value of the automotive parts that have been ruined through corrosion caused by soldering preparations containing acid. NOKORODE is (as its name implies) absolutely non-

corrosive and harmless to metals. One lb. cut with a gallon of water will solder all metals, and will not burn the mechanic's hands or clothing.

This is one of the reasons why so large a percentage of automotive manufacturers use NOKORODE.

ORDER a trial can under our guarantee offer using the coupon below.

THE M. W. DUNTON CO.
Providence, R. I. U. S. A.

The M. W. Dunton Co.,
670 Eddy St., Providence, R. I.

Gentlemen:—

Enclosed find \$1.00 for which please send me a one-pound can of Nokorode Soldering Salts. It is understood that these Soldering Salts will satisfy me in every way, or you will refund my dollar.

Name

Address

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

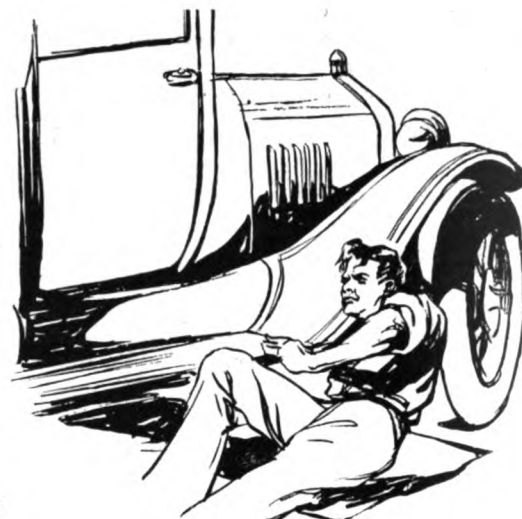
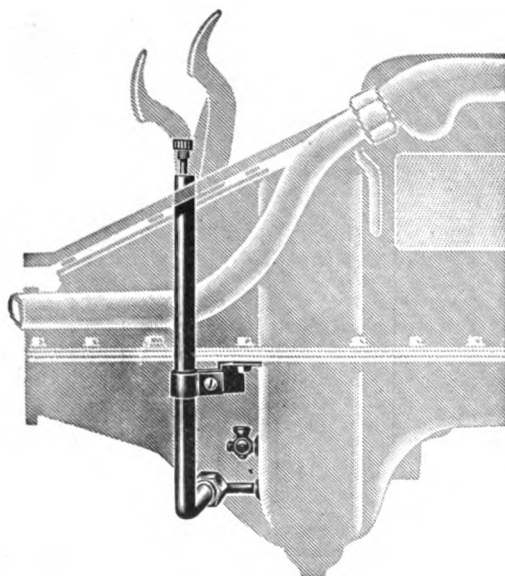
**When a Ford
Has Just Enough Oil**

**When the Oil
is at the Right Level**

**When Level is Approach-
ing the Danger Mark**

The
**SCHAEFER
OIL
WATCH
TELLS**

No more crawling under the car. Oilwatch is adjusted from driver's seat. Driver just lifts rod out with an easy movement and looks at its lower end. High, low and middle levels indicated by three raised marks and oil on rod shows where it stands and its exact condition. An easy push replaces rod so it cannot rattle or work loose. It takes just five minutes to install the Oilwatch.



**The Old
Way
and
The
New**



Ford dealers are selling two Oilwatches a day—easily and at a fine profit. Every Ford owner is a prospect for this safety device, as it is an assurance against burned out bearings, it's a reducer of expenses, an eliminator of trouble, and a preserver of clean clothes. Tell your customers about Oilwatch. It retails for only \$2.50. Carry Oilwatches in stock so you can meet the demand.

Mail This Coupon Today

Philip Schaefer & Company
20 E. Jackson Blvd., Chicago, Ill.

Please send me your dealer proposition:

Name

Address

Jobber

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

suring perfect vaporization of the present day gasoline or kerosene, thus generating a very high degree of heat on a low fuel consumption and without clogging the burner.

A flared tube in front of the fuel jet automatically siphons the correct proportion of air, regardless of the size of flame desired. This has been worked out accurately as to size, length of tube and degree of taper, and so eliminates troubles due to holes in the burner tube.

In the Turner torch, the adjusting needle is pointed, like a carbureter adjustment. It is separate from the shut-off needle and offers an accurate regulation for any flame size. The small wheel handle on the adjusting needle makes it impossible, it is said, to use sufficient leverage to enlarge the orifice.

The shut-off valve is used to shut off the flame, being a separate unit from the adjusting needle or orifice needle.

A soft copper feed tube inside the tank, with screen, is designed to prevent dirt from clogging the burner.

The lubricator for the leather cup is a grease cup, having a recess which is filled with vaseline. This is directly in contact with the leather cup on the pump plunger, thus keeping it soft and also lubricating the pump cylinder.

Turner air pumps are made on the parachute principle, with plenty of space for the air to pass the plunger on the upstroke, while on the downstroke the air inflator spreads the leather cup and forces a full cylinder of air into the tank.

The Turner Master line pistol-grip handle is large enough for any size hand, as it has no obstructions or brackets and does not tire the user.

Requests for descriptive literature, prices, etc., should be addressed to The Turner Brass Works, Sycamore, Ill.

A Torit Today Will Bring Dollars Your Way.

"I think every garage should have a Torit torch because it is so handy and low in cost and pays for itself so quickly. The torch I got from you comes in very handy. It helps me save time and I can now do work I formerly turned away."

So wrote one Chicago repairman regard-

ing the Torit acetylene torch No. 13. And he had used this torch for repairing leaky radiators, sealing batteries, lead burning, soldering connections on wire, loosening rusty bolts and nuts, preheating for straightening sheet metal parts, tempering tools and general soldering work.

He said that he found the tips and soldering iron, which are furnished with the Torit torch, just the thing for all around work.

There are many repair jobs for which the Torit torch will be found useful—such as joining light tubing, babbitting, brazing, thawing pipes, fender straightening, removing sulphated battery terminals and heating rivets, and various others.

The Torit torch is easy to use and gives instant heat. It is a light weight outfit which can easily be carried to work, a feature which will be appreciated by the repairman.

Garagemen and repairmen who are interested in increasing shop earnings will find it worth while to write the St. Paul Welding & Mfg. Co., 165 W. 3rd St., St. Paul, Minn., for further details.

"Special" for You, Mr. Garageman! A New Electric Drill.

A new light-weight, ball-bearing, portable electric drill, designed for the particular use of garages and automotive repairshops, has been placed on the market by the Cincinnati Electrical Tool Co., of Cincinnati, Ohio.

The new drill has a capacity of $\frac{1}{2}$ -inch in steel. It weighs only 14 pounds, and carries a universal motor for use on either direct or alternating current.

A Jacobs chuck, an extra detachable side handle and ten feet of cable, with a Hubbell attachment plug, form a part of the drill's equipment. As an extra, a mandrel, with a 3-inch by $\frac{1}{2}$ -inch grinding wheel to insert in the chuck for light grinding, is furnished.

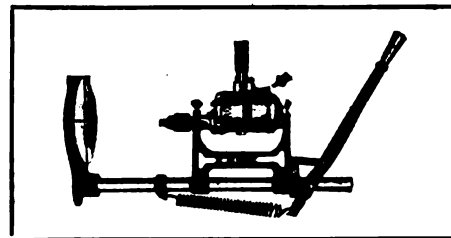
The entire motor frame, switch handle and end handle are made of aluminum. The motor windings are fully enclosed, dirt and dust-proof, and all working parts are protected. A fan mounted on the armature shaft air-cools the motor.

High-grade annular ball bearings support both ends of the armature shaft. A ball-thrust bearing is provided for all end-thrust. The chuck spindle is carried by a phosphor bronze bearing, of ample size to withstand irregular drilling pressure.

A 50 per cent overload allowance is provided for by the switch, which is of a special patented design and of the quick make-and-break type. The switch is enclosed in the handle of the drill and is operated by means of a push button through the handle.

Gears of special analysis steel, heat-treated and hardened, carefully enclosed and operating in grease, are used.

For use with this new "Garage Special" portable electric drill, the same manufacturer is offering a special bench drilling stand, with which it is possible to convert the drill into a bench drill press in a few



"Garage Special" Drill Attached to Bench.

seconds of time. A cap and thumbscrew locks or releases the drill.

The stand has a column height of 24 inches, the maximum height from base to drill chuck being eight inches. The diameter of the base is 10 inches. The entire stand weighs 45 pounds.

The drill bracket with the drill can be set at any point on the column and raised or lowered as desired, a spring in the rear of the column balancing the weight of the drill and bracket.

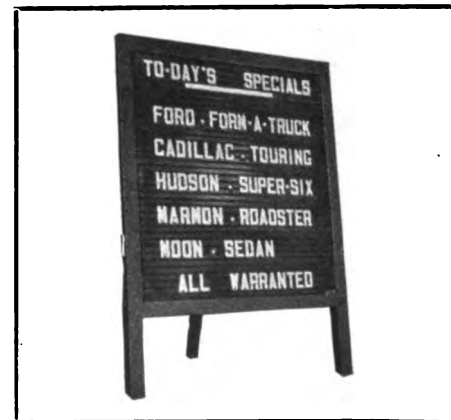
A key on the bracket and a keyway in the column keep the drill in vertical alignment. The depth of the holes is regulated by an adjustable stop in the column. A lever feed, with quick return, is another feature of the stand.

Further details concerning these excellent new garage tools may be obtained, upon request, from the Electrical Tool Co., Cincinnati, Ohio.

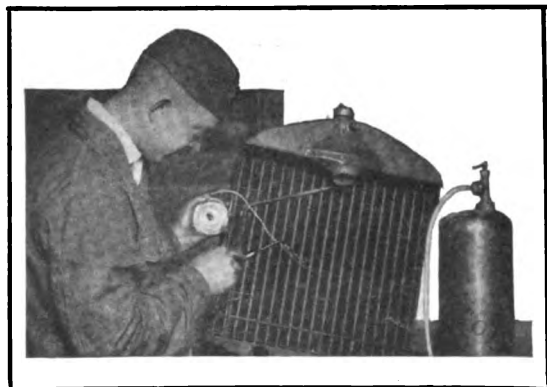
Unitype Signs Can Help You to Sell the Cars.

"Unitype" signs will at once suggest to dealers an excellent means of advertising. By means of a "Unitype," you can tell passersby of special car offers in a way that will attract attention and make sales.

This is an attractive and practical sign. It is enclosed in glass, made of the best selected, black, satin finished enamelled metal with strong white lithographed metal letters. Each letter is a separate unit that may be quickly and easily applied with broad combinations of arrangements. They are

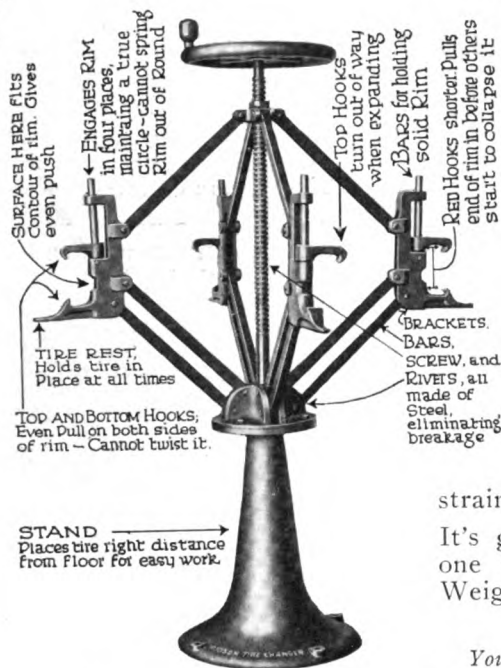


"Unitype" Signs Help Sell Used Cars.



Torit Torch Useful in Soldering Operations.

The HUDSON TIRE CHANGER



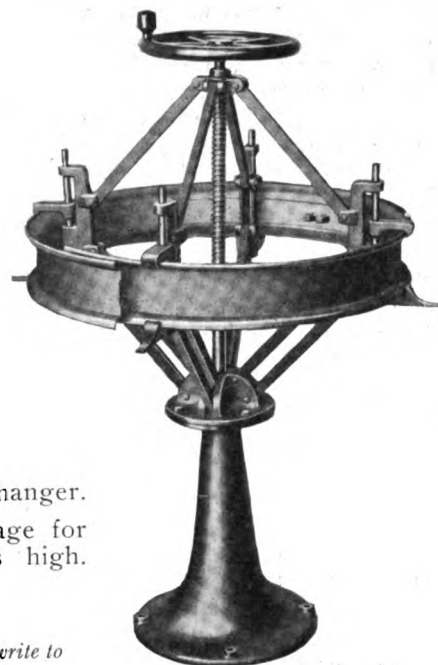
JOBBER
A fine proposition for you. Write immediately.

THE REAL EQUIPMENT FOR THE JOB
Whether it's an old rim or a new one—hard or easy—the Hudson will handle it and handle it well. Hudson construction, Hudson power, and Hudson ability to withstand strains make it a "real" tire changer.
It's guaranteed against breakage for one year. Stands 40 inches high. Weighs 80 pounds.

Price \$35.00

You will want further particulars, so write to

HUDSON PRODUCTS CO.
155 Grand Ave. Portland, Oregon



TIREMEN
Worth-while offer for one tire shop in each locality.

The Best Tire Changer at any Price

The Original Hough Townplate—



Every car owner in every locality is a prospect. Hundreds of dealers are finding the Hough Townplate their most profitable accessory. Endorsed by Chambers of Commerce and Business Men's Associations.

A Traveling Advertisement for You

Hough Townplates, bearing the name of your town, are 2"x10" in size, handsomely embossed and enameled in two colors to match 1922 state license plates. Securely attached with Hough patent fasteners.

Put our attractive Hough Townplate display card in your window or on a counter and every motorist will purchase the "Hough" to boost the home town. Retail for \$1.00. 100% profit for you on every sale.

Write for complete particulars.

FRANK G. HOUGH & CO.

ROOM 300

650 N. Michigan Ave.

CHICAGO

WOODLAWN

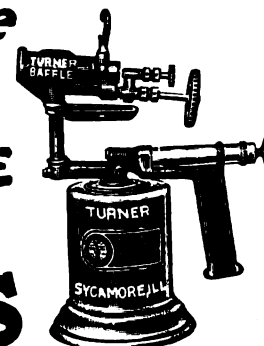
MACON

WHEELING

SIOUX CITY

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

TURNER Master Line GASOLINE and KEROSENE BLOW TORCHES



The perfection in design, material and construction of the new "MASTER LINE" Blow Torches, the increase in efficiency and reduction in hazards will delight every garageman and repairman. The pistol grip handle, automatic safety valve and air release, baffle in burner and one-opening tank are just a few of the noteworthy features that make Turner "Master Line" torches incomparable.

Complete particulars on request

We also manufacture Lead-Burning Torches and Welding Cutting Outfits.

THE TURNER BRASS WORKS

Sycamore

Illinois



built into frames of mahogany or oak, as well as in beautiful dark statuary bronze finish on pure copper. Or they may be had in polished brass or pure nickel silver.

There are a number of models of this sign, so that you can select one which is most suited to your establishment.

The letters are very easily changed, as they simply hang in place on the sign bars, and any letter may be removed without disturbing any of the others.

Each "set" or "font" of letters, furnished with a "Unitype" sign, contains a certain fixed assortment that is similar to a printers' font of type, and includes the letters of the alphabet, numerals, punctuation marks and characters and is apportioned as nearly as possible to meet the average for all uses. For instance, a set of 264 1¼ inch letters contains 176 letters, 46 numerals and 19 other characters with a greater number of those of more frequent occurrence, such as A, E, O, S, T, etc.

The standard sets are all machine-cut and machine-counted, insuring positive uniformity and permitting the modern prices. Each size of letters is packed in a separate compartment box.

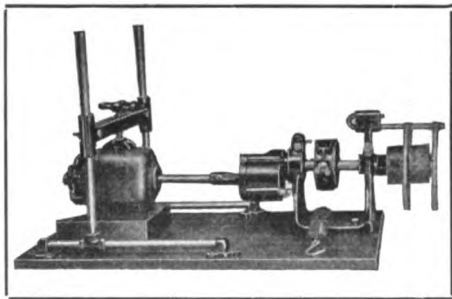
A wire easel back support is included with each sign up to 42 inches high, or they may be had with brass hanger plates for wall suspension. Any of the signs can be supplied with extension easel legs matching the frame, including a back rest with chains.

Descriptive literature and prices may be had upon request from the W. L. Clark Co., Inc., 538 Pearl St., New York, N. Y.

Low-Priced Electrical Test Unit Saves Time and Labor.

A low-priced and extremely practical machine for testing starters, generators and magnetos has been perfected by the Reliance Battery Products Co., 2298 South 8th street, Council Bluffs, Ia.

This machine makes it possible for the repairman to repair and test without go-



A Practical and Time-Saving Test Unit.

ing to the trouble of installing in the car each time a test is necessary. The chief features of the Reliance test unit are: Low price, simple construction and general adaptability to the needs of the average shop.

It has a special feature in that Ford F. A. generators mesh directly into the drive and can be turned at any angle while under

test, so that adjustments can be made without removing the generator from the test unit.

New Air Compressor Offered by Wayne Tank & Pump Co.

Garagemen and service stations will be interested in hearing that the Wayne Tank & Pump Co., of Fort Wayne, Ind., is placing on the market a new air compressor, in the construction of which a number of particularly good features have been incorporated.

A Wayne two-stage compressor is one in which the air is compressed twice, being cooled between the two stages of compression and again before the delivery of the air into the receiver. This type of compressor was designed to care for the extreme temperatures generated in compressing air to the pressures necessary for tire inflation work.

All Wayne compressors are noiseless in operation, run without vibration and can be run continuously against 200 pounds pressure without overheating. The manufacturer guarantees that every machine will show an efficiency better than 70 per cent.

The lubricating system of the Wayne compressor is automatic, positive and regulated. No reciprocating part of this compressor touches the oil level. The main shaft is equipped with two fingers that pick up just the required amount of oil at each revolution. These drops are hurled against a fin, known as the distributor, cast in the roof of the compressor. This distributor actually directs the oil where it is required and in exactly the right quantity. The compressor is so designed that it is impossible to throw oil directly into the cylinders.

Adjustments are easily made, as every moving part is immediately accessible. By removing the top cap, connecting-rods and connecting-rod bearings are exposed to plain view.

The Wayne compressor has two cylinders and two pistons operating independently of each other. In the event of any accident to either of the cylinders or pistons, that cylinder and its piston can be disconnected and the compressor can still be operated with the other piston and cylinder. All parts are made interchangeable.

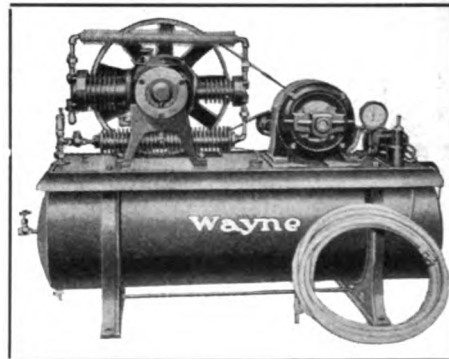
The bed plate is of one-piece construction, ribbed underneath for strength and of ample proportions. The legs are of one piece, bolted to the bed plate and tied at the bottom with a ¾-inch strut rod.

All Wayne compressor outfits are equipped standard with a single phase induction motor, where used in connection with alternating current. If required two- or three-phase motors can be supplied. The compound-wound type of motor is supplied when used in connection with direct current.

The receiver is built of the best tank steel especially for pneumatic pressure service. All seams are brazed and the receiver

is tested to a hydrostatic pressure of 400 pounds. Each receiver is equipped with a drain cock.

Wayne compressors have an automatic control, which is totally enclosed, and is of the four-point contact type. It is positive in action and operates without arcing. The diaphragm is of metal to metal construction and can be removed without disturbing the other mechanism of the control.



New Two-Stage Wayne Air Compressor.

The control is adjusted at the factory to trip at 140 pounds and to cut out at 175 pounds. However, these pressures at which the control will function may be changed if desired, by adjusting the set screw at the end of the control clockwise for higher pressure and counter-clockwise for lower pressure.

Cylinders are cast from best quality gray iron, bored and reamed to size, and each cylinder is cast independent of, but bolted to the crankcase. Each cylinder is equipped with six radiating fins to assist in the cooling operation. The heads are bolted on.

All valves are of the plate type, ground to seat and the spring actuated. The clearance space has been reduced to a minimum.

Pure aluminum casting of one-piece construction has been used for the inter-cooler with 53 radiating fins, which cools the air between the two stages of compression. This inter-cooler, it is said, by virtue of its scientific design, material and finish, has shown exceptionally high efficiency.

The after-cooler is a gray iron casting, with 32 radiating fins, which cools the air after the second stage and before delivering it to the receiver.

Wayne compressors are built in five models, and are designed for use in filling stations, service stations, garages, tire shops and factories.

Specifications covering the different models, prices, etc., will be forwarded to those interested upon request by the Wayne Tank & Pump Co., 774 Canal St., Fort Wayne, Ind.

Where Motor Cars Were Once Strictly Prohibited.

Motor vehicles were strictly prohibited on the Island Prince Edward from 1908 to 1913, after which automobiles were permitted to be driven on the streets of Charlotte-



NEPTUNE

The Pure Distilled Water For **STORAGE BATTERIES**

Why Dealers Can Realize Attractive Profit by Stocking Neptune Distilled Water:—Did you know that all battery guarantee is subject to the use of distilled water. Motorists have need of distilled water at least twice a month; so have you, Mr. Garageman, for the cars in your garage. Make it an added bit of service.

Neptune Distilled Water is pure—free from mineral or organic matter in suspension or solution. It means Long Life to Batteries. Why should a car owner go to a drug store to buy a clumsy gallon bottle when he can secure a Neptune Special Half-gallon bottle for Storage Battery use? Send in your order today.

Hinckley & Schmitt Inc.

420 W. Ontario St.

CHICAGO, ILL.

Small Investment — BUT — Substantial Profit. Who is a more logical dealer in distilled water for storage batteries than the garage owner and accessory dealer? When a motorist buys his lubricants and accessories, sell him his battery maintenance requirements as well. Cost to dealer \$2.50 for case of 12 half-gallon bottles; retails at \$3.60. The bottle and case have a value of \$1.70 (50 cents for case and 10 cents a bottle) anywhere in the U. S.; we will refund this amount if returned to us. All prices F.O.B. Chicago. Send money or check with order.



We Sell Your Used Cars

—and you know it's the hardest problem in the business today to keep them from stacking up on your hands.

"UNITYPES"

actually sell them for you—besides they bring new customers off the street into **your** place—to **buy**—

You could afford to invest in ten or twenty of them,—but you don't need to—one or two will dress up your window and be live, silent salesmen as well.

In use all over the world.

Made in many styles and at prices from \$3.50 up.

Ask for catalog "A. G.-20" applied to Auto Dealers.

W. L. CLARK COMPANY, Inc.
538 Pearl Street New York
Patentees and Exclusive Makers.

**When Springs Are
Properly Lubricated**
they're squeakless, easy riding, and troubleless.

COMPTON Spring Oilers

—made of metal and a special felt—fit snugly around springs and distribute the proper amount of oil for lubrication. They're positive in action, permit a free and easy movement of the spring leaves, absorbing all shocks.

Compton Spring Oilers are very easily attached, too. No drilling or changing parts is necessary. And every oiler is guaranteed.

| | | | |
|------------------|---------------|-----------------------|---------------|
| FORD CARS | \$2.00 | All Other Cars | \$4.00 |
| PER SET PREPAID | | PER SET PREPAID | |

Box 25

Compton's Spring Oiler Company

29 Broadway, New York, N. Y.

STATE DISTRIBUTORS WANTED.—A splendid proposition awaits you. Your territory may still be open. Write today.

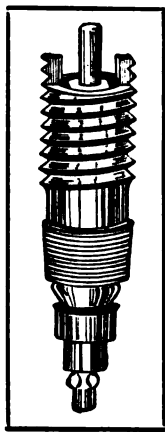
town and one other small town on three designated days per week. Practically all these restrictions were removed in 1919, except that motor vehicles are not allowed to operate outside of towns and cities during the month of April when the roads are very soft from spring thaws.

Progress has been remarkable since these restrictions have been removed, says Consul Crosby in a report to the Department of Commerce. Today there are 1,753 passenger cars registered in the Province, which has a population of 88,000 people. There are only 70 trucks registered in the province and most of those are of $\frac{3}{4}$ -ton capacity or smaller, due to the poor country roads.

It has been intimated that efforts will be made to limit the capacity of trucks in the Province, but no definite decision has as yet been reached. It is estimated that there are 58 wheel-type and 26 caterpillar-type tractors in use but, on account of the small size of the farms in the Province, the owners of the tractors are of the opinion that they are not an economical success. Three motor-propelled fire-fighting engines are in use in Charlottetown, it being the only city in the Province which uses self-propelled apparatus.

Allen Valve Inserts Designed to Give Mechanically Perfect Part.

The "Allen" type valve insert has been on the market for over a year and is designed to provide a more thoroughly leak-proof and more efficient tire valve than has heretofore been obtained. But the "Allen" valve insert was designed with the view of producing a mechanically perfect and serviceable part. It is claimed that it presents an adequate change and a great improvement in this important tire accessory.



Allen Valve Insert.

It is interchangeable with older types of valve cores, and functions properly with any air connection. The manufacturers emphasize the following points of superiority and exclusive features:

The spring is entirely enclosed; the complete inside is rigid, sturdy and compact, making it very easy to insert in a stem when the tire is carrying pressure; a special composition valve seat and compression ring give an unusually long life under the abuses which they receive in service; and rigid inspection assures practically 100 per cent serviceable valve cores.

The "Wedford" Allen valve inserts are manufactured by the Allen Valve Mfg. Co., 1128 Van Nuys Bldg., Los Angeles, Cal., and are distributed by the Wedler-Shuford Co. of St. Louis, Mo.

Paragraph.

WAYNE OIL TANK & PUMP Co., Fort Wayne, Ind., announces that on April 17 the name of this company was changed to Wayne Tank & Pump Co., and that this is the name which the company will use hereafter.

This change in name was found advisable because of the recent purchase of the Borromite Co. of America by the Wayne Oil Tank & Pump Co. The Borromite Co. of America formerly controlled the patent rights and sold Borromite water-softening systems. These will be marketed hereafter under the name of Wayne water-softening systems.

BOOK REVIEW.

SERVICE STATION MANAGEMENT, ITS PRINCIPLES AND PRACTICE, by Charles L. Jones. Published by D. Van Nostrand Co., New York, N. Y. 172 pages, 6 ins. by 9 ins. completely illustrated; price \$2.

The word "Service" seems to be about the busiest word in the dictionary nowadays. In fact, we might divide the people into two classes—the folks who want to know where they can get the best service, and those who want to show the first class just how well qualified they are to offer superior service.

And it is in this new book, by Charles L. Jones, that the latter group are going to find many an idea to help them in attaining the desired end. It offers a complete analysis of the successful operation of a garage covering each detail of service station management. Methods and practices which have proved valuable when used by some of the most progressive and successful automobile dealers and service stations are outlined.

The book is divided into ten chapters, under the headings: Service, Selling Service, Labor Charges, Service Organization, Service Station Layouts, Service Station Equipment, Shop Management, The Stock Room, Handling Claims for Parts Short or Damaged in Shipment, and Handling Defective or Worn Parts.

Under the classification "Service Station Layouts," a number of suggested plans for service stations of one and two floors are shown, with the positions to be occupied by the various pieces of shop equipment clearly indicated.

In the chapter assigned to "Service Station Equipment," tools, jigs, fixtures, machines, etc., required for overhauling cars, trucks and tractors are listed and described.

A number of practical shop record forms are illustrated and explained in the chapter entitled: "Service Station Management," and a number of practical suggestions are given for the general routine of the shop.

Statement of Ownership of "American Garage & Auto Dealer."

Statement of the ownership, management, circulation, etc., required by the Act of

Congress of August 24, 1912, of "The American Garage & Auto Dealer," published monthly at Chicago, Ill., for April 1, 1922.

State of Illinois, County of Cook, ss.—Before me, a notary public in and for the state and county aforesaid, personally appeared S. R. Edwards, who, having been duly sworn according to law, deposes and says that he is the Editor of "American Garage & Auto Dealer" and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, postal laws and regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

Publisher—American Garage & Auto Dealer, Inc., 116 S. Michigan Ave., Chicago.

Editor—S. R. Edwards, 116 S. Michigan Ave., Chicago.

Managing Editor — S. R. Edwards, 116 S. Michigan Ave., Chicago.

Business Manager — J. R. Hastie, 116 S. Michigan Ave., Chicago.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)—H. D. Fargo, 116 S. Michigan Ave., Chicago; J. R. Hastie, 116 S. Michigan Ave., Chicago; S. R. Edwards, 116 S. Michigan Ave., Chicago; I. B. Lipson, Fort Dearborn Bldg., Chicago; R. S. Clissold, 327 S. La Salle St., Chicago; J. W. Hastie, 3325 Washington Blvd., Chicago; E. C. Cole, 431 S. Dearborn St., Chicago; S. G. Levy, Fort Dearborn Bldg., Chicago; E. T. Clissold, 327 S. La Salle St., Chicago.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.)—None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

S. R. EDWARDS.
Editor.

Sworn to and subscribed before me this 1st day of April, 1922.

(Seal.) James C. Greenslate.
(My commission expires April 28, 1923.)

Dealers and Salesmen

if you do not sell

Wollo-5 feature spark plug

then we both lose money. Plug sparks in oil, saves gasoline. Rapid seller, good repeater.

Write today.

WOLLO—3328 OLIVE ST.

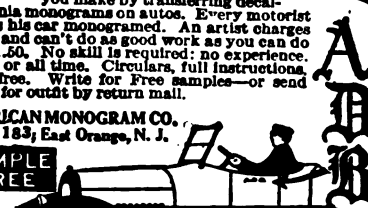
ST. LOUIS, MO.

COSTS \$2.50 PROFIT \$27.50

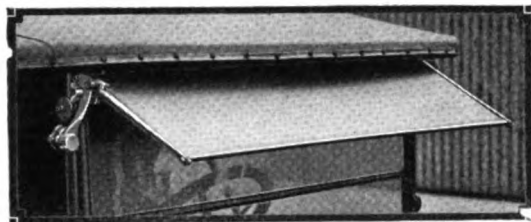
That's what you make by transferring decalomania monograms on autos. Every motorist wants his car monogrammed. An artist charges \$5.00 and can't do as good work as you can do for \$1.50. No skill is required: no experience. Spare or all time. Circulars, full instructions, etc., free. Write for Free samples—or send \$2.50 for outfit by return mail.

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Jaknife WINDSHIELD VISOR



WITH THE UNIVERSAL CLAMP
THAT FITS ALL WINDSHIELD POSTS

These are the days that demand extra precautions for safe driving. Rain and sleet—obstructed windshields—glaring headlights—dazzling rays of the Sun—these are some of the dangers against which every careful motorist must guard. Prepare against them now by ordering the JAKNIFE visor, and you have an all-seasonal driving safety.

2 Sizes fits 100% of all cars of standard make.

Made of best quality material and workmanship.

Ask your jobber for demonstration and prices.

Roberts Mfg. Co., New Haven, Conn.

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Real Leather FAN BELTS

Our Group Fan Belts are especially popular this year. They enable you to fill all ordinary requirements from a very compact stock.

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Ask your
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Results tell the tale

A perfectly made piston ring, equally efficient for compression and oil troubles, with an oil-sealing, oil-controlling channel, the only one with outlets to release excess oil, preventing clogging. The "self-sealing" surface fits itself to out-of-round cylinders. 8 rings are installed on each piston.

Was
~~\$1.00~~
Now
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Up to 4 inches. Effective April 1st.

Write for Descriptive Folder and Discounts

Complete descriptive folder, "The Balance of Power," will gladly be sent on request. Address factory or nearest Distributor listed below. Good discount to Dealers and Repair Shops. We also have an especially attractive Service Station proposition for responsible Dealers who will carry a small assorted stock. Ask for details.

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The Motor Industry Specialty Co., 1807 McGee St., Kan. City
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TELL-TALE

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PISTON RINGS

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

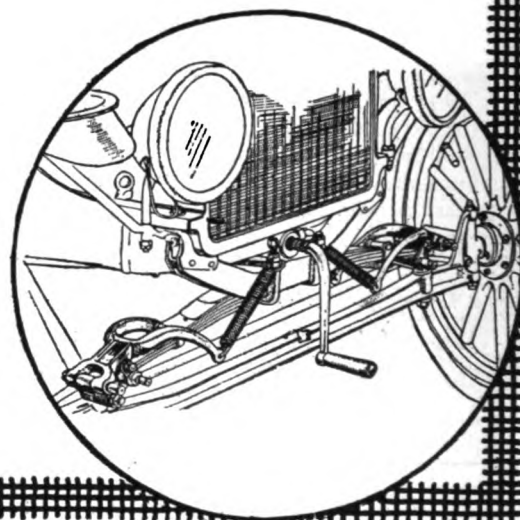
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

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This labor-saving device will pay for itself many times in the shopmen having all tools and parts near the job. The bench is easily moved. Sturdy and well built throughout. Room for parts and tools—trays and compartments.

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TIMER

Has stood repeated and rigid tests for over five years and has proven a genuine quality article and a boon to every Ford owner. Increases power, insures an instant start in all weather, lessens fouling of two front plugs, saves gasoline and stops motor "kicking." Is oil, grease and water proof. Requires no oiling and is easily installed.

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I'm off the main highway, but I sell the goods because I have

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My customers like the convenience of paying for petroleum products with coupons. They like the quick and accurate service. They like the saving where a discount is made for cash.

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The Raceway is of patented construction, made in four sections and cut against the grain. Expansion and contraction without warping is a feature.

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are OH KAY sellers because they are guaranteed. Note the substantial construction and it will be easy to understand why we have the largest individual factory specializing on timer manufacture.

On a solid ring fibre you get two of the wearing surfaces with the grain and two against the grain; this is one of the principal causes of a "humpy timer."

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A Better Timer to Time'er Better
for all types of Fords and Tractors.
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If for any reason an M & R Timer is not satisfactory, we will replace it without charge

The Retaining Ring binds the four-piece raceway and keeps it absolutely rigid so that the posts cannot touch shell and short-circuit.

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THE FRISZ WHEEL & GEAR PULLER NEVER SLIPS



Made in
FOUR SIZES
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of all size
gears and
wheels

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Get the Frisz Wheel and Gear Puller. Its massive gripping fingers hold like a ship's anchor. They never slip and their grip is equally automatic, whether expanding or contracting. The drop forged, high carbon, nickel steel arms are always parallel with the power screw. This means a pull always in a straight pull—an easy pull.

Free from complicated parts. Needs no special attachments. Made of finest materials; heavily reinforced where stresses come heaviest.

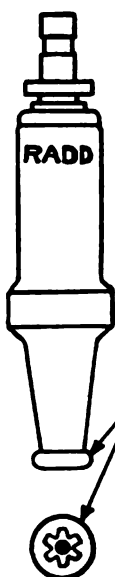
Get the Frisz Wheel and Gear Puller from your jobber—today.

JOBBERs—Write for our interesting proposition.

FRISZ MFG. CO.

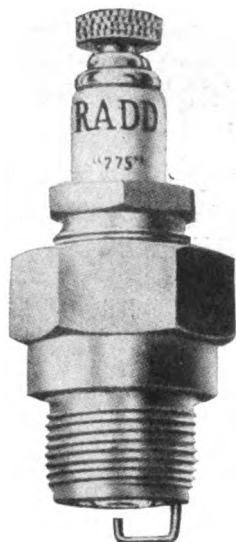
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PLUG**
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Science applied to Spark Plugs has produced the Marvel Plug of the day—the RADD.

RADD plugs don't just happen to give good service. They are made that way, electrically.

Research has proven that the auxiliary CAP on the end of the porcelain of a Radd Plug reduces the sparking voltage 40%, increases the current 100%, and maintains the spark twice as long as with the ordinary gap plug.

The results are what count. They buy Radd Plugs—because

1. Misfiring is stopped.
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Mechanically right and electrically superior.

Dealers: Don't miss a good buy.

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Genoa, Illinois

Leich Electric Co.,
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Kindly send complete information and trade prices on Radd Spark Plugs.

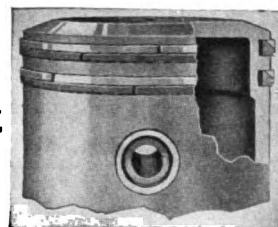
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MOST PERFECTED PISTON RINGS



THE only "Combination-type" Piston Ring, both compression and oil-tight, Perfected even-radius wall pressure every thirty degrees, Rapid seating, Long life, and sold with an absolute money-back Guarantee.



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outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.



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Write for data and prices on brake lining, clutch facings, Ford Transmission lining, running board mats and packings.

Manufactured by
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A Flexlume Sign

*Is a Traffic Cop Turning
Business Your Way*

ONE user says: "My Flexlume Electric Sign is like a traffic cop directing buyers through my store." He might have added that his Flexlume is a big, good natured, cheerful "cop" who radiates confidence, friendliness, good will.

Raised, snow-white glass letters on a dark background make Flexlumes excellent day signs as well as electric night signs. They have greatest reading distance, lowest upkeep cost, most artistic designs.

*Let us send you a sketch showing a Flexlume
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Flexlumes—Electric Signs Made Only By The Flexlume Corporation



See for yourself

Send for Free Sample—Use as a Test—
You will be satisfied.

A popular soldering specialty for garage use.



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No more complaints from customers about broken valve seats, springs, or washers—no more awkward handling of a clumsy crowbar to remove your Buick Valves. No need to worry about your valve cleaning—Buffum Buick Valve Remover will make that job easy.

You'll readily see your need for them in your own garage and you will want to get in on our dealers' proposition and urge your customers to

GET A BUFFUM BUICK VALVE REMOVER

and keep it handy for their own use. They will realize its handiness in locating trouble on the road and will soon appreciate the difference in their Buick when the carbon is cleaned from the valves.

For your garage and for resale you need the Buffum Buick Valve Remover.

RETAIL PRICE \$2.00 FULLY GUARANTEED

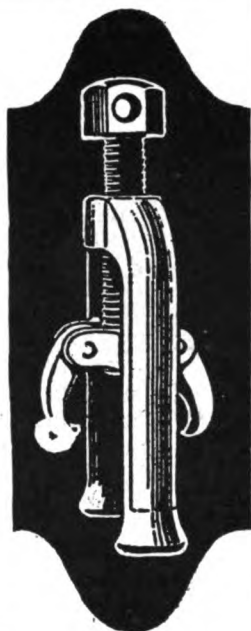
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Factory and General Offices

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LET'S HAVE THAT NEXT ORDER!

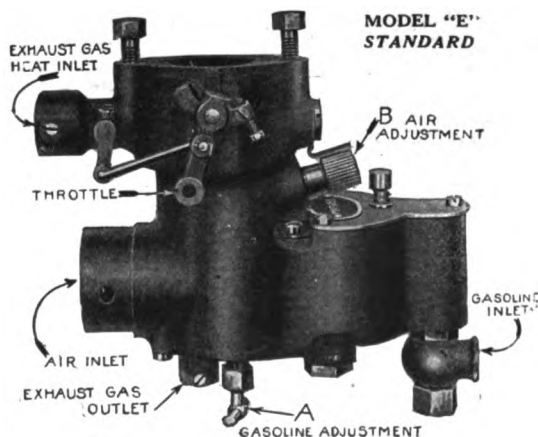
**When you need a Doctor
Do you get estimates?**

NO! you engage a Physician in whom you have confidence. That's why you use F.A.A. ALUMINUM and CAST IRON MENDS. You have confidence in them in making permanent repairs, such as scored cylinders, cracked water jackets and aluminum castings.

**F. A. A. Aluminum and Cast Iron
Mends go straight to the job.**

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Universal Satisfaction

POWERFUL—

ECONOMICAL—

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Write for our new Catalogue

MARVEL CARBURETER CO.
FLINT, MICHIGAN, U. S. A.

A Live Tip from One Dealer to Another



Frank Rose Mfg. Co.
Gentlemen:—

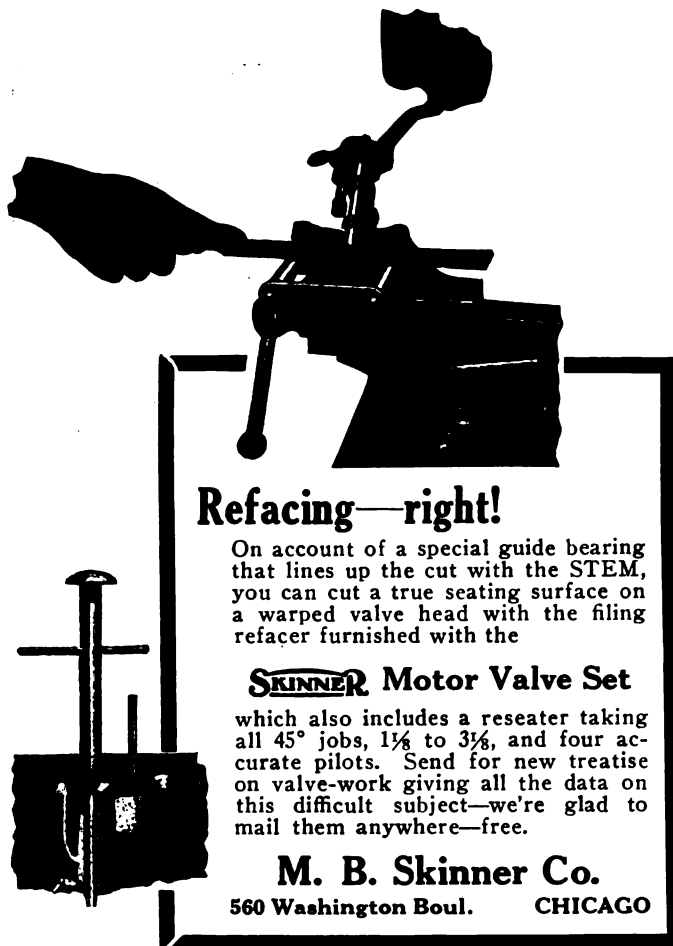
I find Rose Tire Pumps always lead their line in sales. That's why I carry only the Rose. It is popular in price and always gives the customer complete satisfaction. No use loading up on three or four lines of slow sellers. That's money wasted when the Rose turns so much faster.

(Signed) E. H. Stone.

Frank Rose Mfg. Co.

HASTINGS,
NEBRASKA





Refacing—right!

On account of a special guide bearing that lines up the cut with the STEM, you can cut a true seating surface on a warped valve head with the filing refacer furnished with the

SKINNER Motor Valve Set

which also includes a reseater taking all 45° jobs, 1½ to 3½, and four accurate pilots. Send for new treatise on valve-work giving all the data on this difficult subject—we're glad to mail them anywhere—free.

M. B. Skinner Co.
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Wilful Destruction

WE are running this picture with appropriate text in consumer publications of national circulation in order to impress upon millions of readers the **absolute necessity** of maintaining adequate and evenly balanced air pressure in their tires.

You can do your part in this campaign of education by telling your customers what **YOU** know about the costliness of under-inflation.

This will not net you a profit on the sale of SCHRADER UNIVERSAL TIRE PRESSURE GAUGES, but will gain for you the good will of your customers.

A. SCHRADER'S SON, Inc.
Brooklyn, N. Y.
Chicago Toronto London

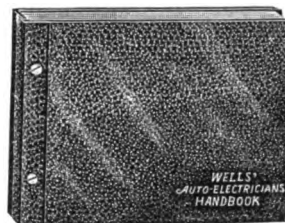
WATERVLiet SPIRAL REAMERS FOR CHEVROLET



With this Chevrolet set you are equipped for a Spindle Bolt, Tie Rod Bolt and Piston Pin jobs on all Chevrolet models. Nicely packed in strong oak case.

THEY WILL NOT CHATTER
Ask Your Jobber. Literature on request

WATERVLiet TOOL CO., Inc.
Albany, N. Y.



Does Your Auto-Electric Service Sell Results, or Only Your Hours of Work?

It's a simple case of add and subtract—

One Hour's Time (plus Wells' Auto-Electricians' Handbook)\$4.50
One Hour's Time (plus Lots of Hard Work and Worry) 1.50

Are you losing, or do you want to make the difference of\$3.00

There are forty reasons why Wells' Handbook is the biggest money maker in the electric service shop—here are three of them:

First— **PERFORMANCE, ADJUSTMENTS, TEST METHODS, CONSTRUCTION**, From 1911 to now, on 1324 models of 270 different makes of cars, for their GENERATORS, MOTORS, REGULATORS. CUT-OUTS.

Second—Real working diagrams, in blue print, of the internal wiring of each unit—with every brush, coil and terminal shown in its actual position as in the machine.

Third—Exact and specific instructions for each different make of machine—with real "brass-plate" information and no glittering generalities.

Do you want to know **HOW** and **WHY** Wells' Auto-Electricians' Handbook will make money for YOUR shop?

Then write today for sample pages and a complete description.

It's easy to buy—and easy to pay for, too.

AUTOMOTIVE PUBLISHING CO.
448 S. Dearborn St., Chicago, Ill.



Profits From Repair Work

The latest invention for soldering, sweating, melting, heating, tempering, light brazing, radiator repairing, etc.

TORIT ACETYLENE TORCH NO. 13

The handy outfit for the garage and repair shop. Quick, cheap, dependable, and will return to the purchaser in a short while many times its cost.

USES ACETYLENE GAS ONLY

Torch with 4 tips, soldering copper, 5 ft. tubing and connection for auto-acetylene tank..... **\$7.50**

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*Auditor, Accountant, Systematizer
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Income Tax Reports**

**Monthly Balance Sheets and
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Unit and Process Costs Established.**

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Add a big paying side line to your present business, selling, repairing and installing Radio Equipment. It is your natural field. Act now. Be among the first. Only small capital required. Interesting agency proposition handling standard makes. We teach you how to install equipment. *Write for particular*

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STORM

CYLINDER REBORING MACHINES

**World's Standard for Speed
Accuracy and Reliability**

Made in All Sizes from Small Hand
Tools to Large Vertical Boring, Bur-
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Capacities to Meet Your Requirements.

Write Today for Complete Catalog
Covering Storm Equipment

STORM MFG. COMPANY
Dept. E. Minneapolis, Minn.



INSTANSEAT seat Instantly PISTON RINGS

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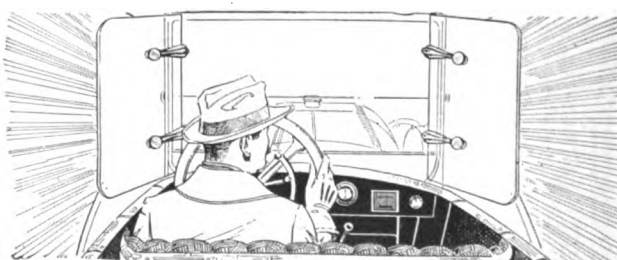
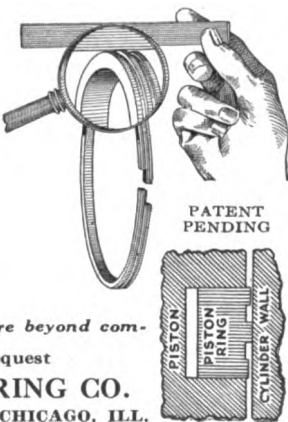
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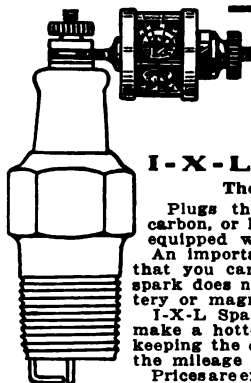
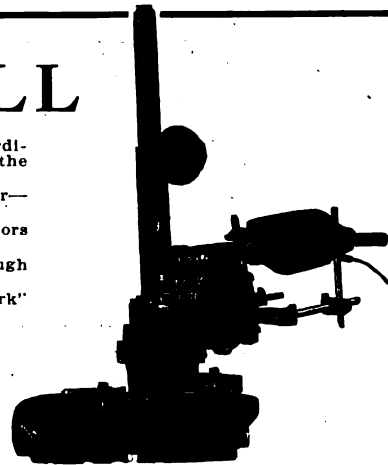
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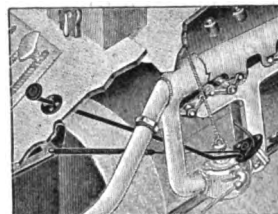
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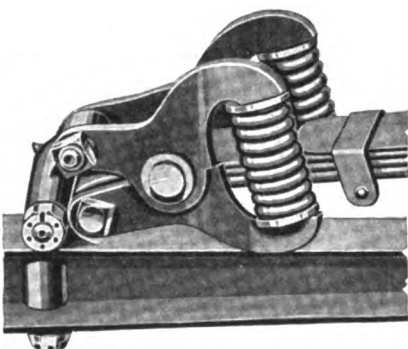
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Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

AUTOQUIP PUMPS



No. 31. Peerless Steel Barrel Anchored into base by Patented Process. Quick acting air chuck, heavy tubing, reinforced base with special ground grip flanges.

PROFIT Plus ECONOMY

There is profit for the dealer in selling one line of pumps—if within that scope he has A SIZE — A STYLE — A PRICE to satisfy every customer. There is also economy, for his turn-over is naturally big.

AUTOQUIP Pumps are so recognized.

Write today for prices and discounts. Giving name of your Jobber.



No. 21 Paramount. High grade single acting pump. LOX-on Jr. Air Chuck. Brass Tube and Brass Check Valve. Heavy Reinforced Base, length 21" over all. A LIFE LONG PUMP.

Autoquip Mfg Co. Inc.

ROCHESTER, N. Y.
MANUFACTURERS OF

LOCKTYPE ANTI-RATTLERS

The Biggest Battery Value on the Market — at Less Cost

Dealers and Service men find it the easiest to sell and more profitable.

**"A STEWART they say—
keeps trouble away."**

STEWARTS assure greater satisfaction, more power and longer life.

Built to a principle of SERVICE and backed by TWO-YEAR WRITTEN GUARANTEE.

Wide-awake dealers are selling STEWART Batteries—and more every day—why not you?

Delay will mean loss of nice trade.

Stewart Storage Battery Co.
MARSHFIELD, WIS.



Our exceptional selling plan and sales co-operation offer one of the biggest inducements ever known in the automotive line. Your territory may be open. We want to meet dealers alive to STEWART'S exclusive agency sales plan. Write us today, stating your business responsibility complete.



Mends punctures and blow-outs

**TO STAY
MENDED.**

This is the original, the genuine, no heat, no cement, no gasolene inner tube repair. Patents, fully covering process, pending.

Notice—Dealers who are interested in securing the most profitable and aggressive sales co-operation ever offered on an automobile product will please write direct to manufacturers.

ROBERT M. BOWES CO., INDIANAPOLIS



**INCREASE YOUR PROFITS
BY MEETING THE DEMAND FOR THE ONLY
MONEY GUARANTEED
BURST PROOF REPLACEMENT RADIATOR FOR FORDS.**

The Jaffe \$100.00 Reward Guarantee has a wonderful appeal for your customers. It is the greatest selling feature ever offered the trade. It means big JAFFE sales for you.

Write for the JAFFE Yellow Book and our new three-color display signs, imprinted with your own name and address.

Jaffe Radiator Co.
741-D W. Van Buren St.
CHICAGO, ILL.

V-Plex



Piston Rings

A Few Agencies Still Open

REPUTABLE mechanics know the value of side expanding rings. This statement is proven by our large business with repair dealers.

Over 90% of sales are repeat orders.

V-Plex rings embody many other special features of particular importance—may we explain them to you?

Exclusive county and sectional representatives for this remarkable, self-adjusting-to-wear-in-all-directions ring are being appointed. Possibly the agency for your district has not yet been assigned. Find out. Write now.

KRASBERG PISTON RING CO.
538 Lake Shore Drive
CHICAGO, ILL.

LYON

RESILIENT BUMPERS

Famous patented opened loop-end construction quickly and easily attached to any car.

Metal Stamping Company
Long Island City

Company
New York

OBRIEN

TRADE MARK

HEAVY DUTY GREASE PUMP

**makes the handling of grease
SWIFT — CLEAN — EASY — SURE**

One man greases any differential or transmission in two or three minutes.

No grease is spilled on car, floor, hands or clothes. Delivers 1/2 pound per stroke. Indicator shows amount used.

Sold on money back guarantee.

1406 S. Michigan Ave. Chicago



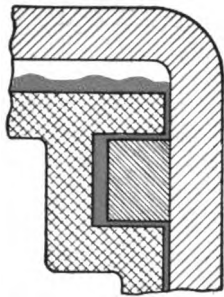


DOUBLE LATTICE TRUSS

Guaranteed to Carry Any Snow Load

For the new garage, or the old one that is being remodeled, this makes the strongest and sightliest construction. Adaptable to spans up to 125 feet—eliminates all posts. Constructed right on the ground where the building is going up. Write for complete information.

LEO McDANIEL CONTRACTING AND ENGINEERING CO.
218-220-222 NINTH ST. CAIRO, ILLINOIS



Conventional and other multiple price rings leak oil around the groove.



Try this on any other ring!

Hold compression, keep spark plugs from fouling, keep oil out of the combustion chamber.

The spring against the ring does the work

3-A Piston Rings are so constructed that they will take care of cylinders at least .003 out of round, even when installed on aluminum pistoned motors, so that reboring is seldom necessary.

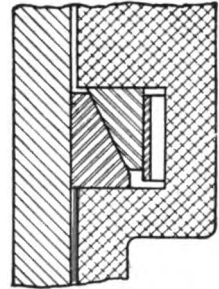
Write for Circular 25

Some territory still open

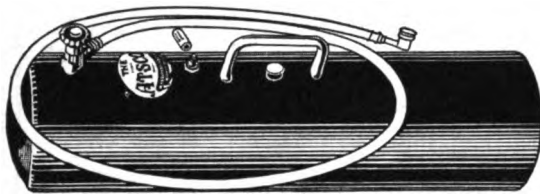
STEEL SPRING PISTON RING CO.

147 Metropolitan Ave.

BROOKLYN, N. Y.



3-A Piston Rings not only fill the groove, but have the same one-piece bearing surface as the conventional type ring.



You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

Pittsburgh, Pa.

YAGER'S

Trade Mark Registered

SOLDERING SALTS

for soldering all metals—just dissolve in water and the flux is ready. Harmless, quick-acting—just the thing for automobile repairs.

Buy it from your jobber in ½ lb., 1 lb., and 5 lb. cans.

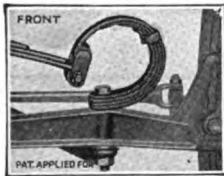
New Prices for 1922.

ALEX. R. BENSON CO., Inc.
Hudson New York



Dealers Wanted!

Exclusive Territory



—to handle Grey Goose Shock Absorbers. Easiest riding absorber of all time. Not only absorbs the shocks but checks rebound instantly. A demonstration sells almost every Ford owner. Easily and quickly attached. Only 4 bolts to change—requires no special tools. Sells for about half usual price for high grade absorbers—only \$10 for complete set of 4. (\$12 in Rocky Mountain States and West.) Liberal discount. Grey Goose Absorbers are also made for Ford Trucks and Dodge Cars. Exclusive territory being assigned rapidly. Write for Folders and Agency Terms.

Indiana Parts Co., Dept. 226 Richmond, Ind.

You Don't Guess the Answer

You READ It on the Blade

Cylinder measurements guaranteed accurate to within .00025" and less.

The AM-PE-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

Get the whole story in our circular.
PRICE \$2.50

AM-PE-CO SALES CO.
Marshalltown, Iowa



A Product That Brings Repeat Sales

AN exceptionally efficient carbon remover, containing no acids, alkalies or ether, and guaranteed not to injure the metal of the engine or interfere with lubrication.

MOTOR-KLEEN has proven a fast-selling article with an unusual repeat sale value.

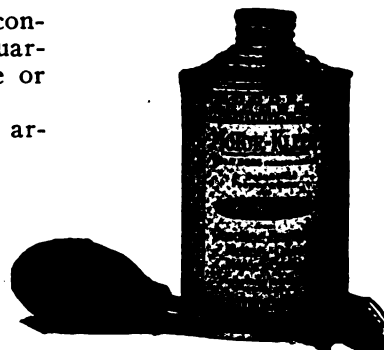
Full information will interest you.

The Motor-Kleen Corporation
Long Island City New York

MOTOR-KLEEN

TRADE MARK

The Scientific Carbon Remover



Pint can (will clean 16 cylinders)\$1.00

Spray (assuring correct measure and complete distribution).... .30

MOTOR-KLEEN CORPORATION, New York
Enclosed find 1... can of Motor-Kleen and 1... can of Motor-Kleen sprays.
Please send me...
Name.....
Address.....
City.....
State.....
A.C.A.D. 17

BRUNNER

74/100 of One Per Cent

Notwithstanding the broad guarantee
on all

BRUNNER Air Compressors

the combined service expense for
1921 including,—

Replacement of parts,
Repair work at our expense,
Traveling expenses,
Service on accessories we did
not make but do guarantee,

was .0074 of the Sales Volume.

It's the guts that count.
A Brunner has real guts.

Your jobbing salesman
will give you full details,
or write us for catalog.

BRUNNER MFG. CO.
UTICA, N. Y.

World's oldest and largest builders of Garage Compressors
Sales Offices: Utica, Cincinnati, Kansas City, San Francisco

Ask an Engineer

An Entirely New Idea in Piston Rings

ZELCOS are made from a special grade of tough white cast iron. They're **coated on the face with zinc** to a thickness of 2/1000 of an inch. Remainder of surface has coating of zinc 1/30 to 1/1000 of an inch thick. They do **not** shopwear. They do not rust.

ZELCO
IN
100%
PIECE
RING
Coated

ZELCOS wear to a perfect fit in less than an hour, simultaneously filling up scratches and porosities in cylinder walls. This glazes surface and retards ultimate wear. No other ring seats as quickly.

45¢ each

DEALERS—ZELCOS simply roll off your shelves—demand is great. Nice profits, too. Customers pleased by smooth running motors and increased power. Jobbers—no sales resistance, performance keeps them sold.

Write for particulars. Our dealer proposition is a winner—or ask your jobber.

ZELCO PISTON RING DIVISION

(Walter A. Zelnicker Supply Co.)

ST. LOUIS



Show them they'll buy

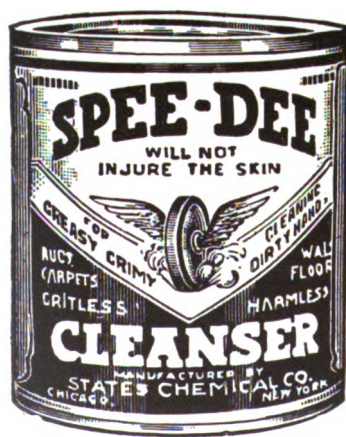
Show your customers Speedee, the wonder hand cleanser. Say —“Just think of the convenience of having a can of Speedee along after you've finished making repairs on the car, your hands are grimy, and you're miles from water.”

Then show them how a teaspoonful of this creamy cleanser will make dirt and grime vanish from the hands and leave them clean and soft. There's no lye, acid or grit in Speedee, to injure the skin.

Your customers and Speedee won't need a second introduction. They will immediately become intimate and lasting friends.

JUST SHOW THEM, THEY'LL BUY!

Send for interesting introductory offer.



STATES CHEMICAL CO.
680 W. Austin Avenue
CHICAGO, ILL.



American Garage & Auto Dealer

Published Monthly
118 So. Michigan Ave.
CHICAGO, ILL.

JUNE, 1922

Vol. 13—No. 6.
10 Cents the Copy.
\$1.00 Per Year.



Every User is a Booster!

Over 20,000,000 inner tubes were permanently repaired with the simple Shaler 5 Minute Vulcanizer last year, and every user is an enthusiastic booster who recommends the Shaler to his friends.

It's easier than sticking on a temporary patch—quicker than changing tubes—the only satisfactory method of making permanent tube repairs, anywhere on the road.

The Shaler is easy to sell. Practically every demonstration means a sale—a satisfied customer who becomes a booster and comes back again to buy extra Patch-&-Heat-Units for use with his Shaler Vulcanizer. Every sale is but the first of a chain of sales on which you make a liberal profit. The Shaler is a necessity that does not come with the car but which every motorist needs—sooner or later.

All Jobbers Sell It—Write for Window Display.

The Shaler 5 Minute Vulcanizer also repairs rubbers, rubber boots, hot water bottles, rubber gloves, coats, etc.

The Complete Outfit includes the vulcanizer and 12 Patch & Heat Units (6 round for punctures and 6 oblong for cuts) and retails for \$1.50—except west of the Rockies and in Canada. Extra Patch & Heat Units retail for 75 cents a dozen. Write now—for our new Window Display, Counter Display, Circulars and other Dealers' Sales Helps—Dealers' Discounts, etc.

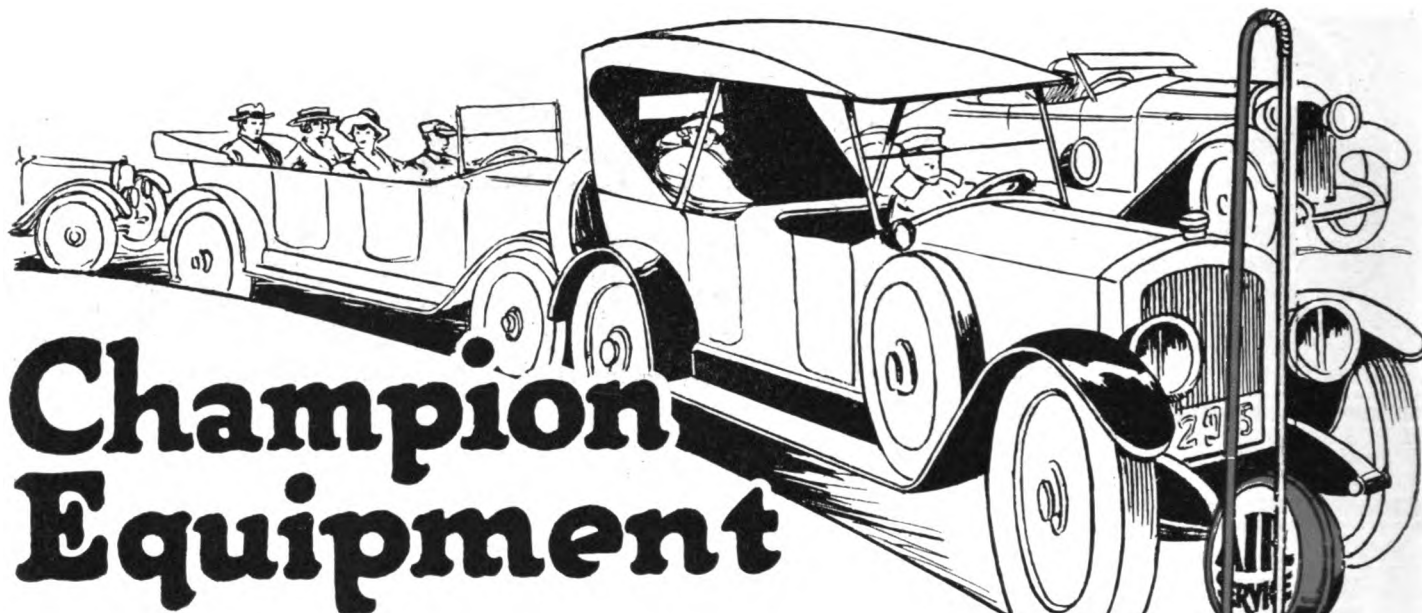
C. A. SHALER CO., 355 Fourth St., Waupun, Wis.



SHALER

**5 Minute
Vulcanizer**

THIS + THIS
VULCANIZES
YOU
IN
5 MINUTES



Champion Equipment

Gets the Business

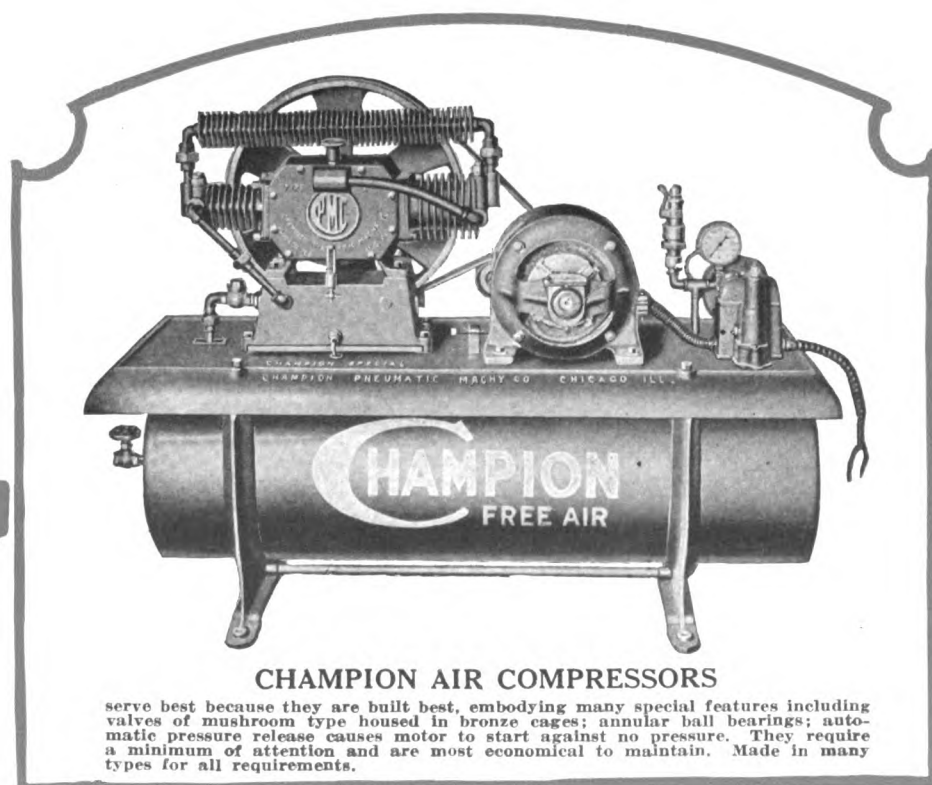
The CHAMPION Air and Water Stand is a winner. Motorists are attracted to service and filling stations having this stand because of its dignified, striking appearance. They are immediately reminded of the need of air and water and a new customer is made for other purchases. The CHAMPION is clean, as

both air and water hose hang clear of ground when not in use. All tires and the radiator can be filled without moving the car, and arm automatically returns to vertical position when user releases hose. No interference with traffic when the CHAMPION is installed.

Write today for literature

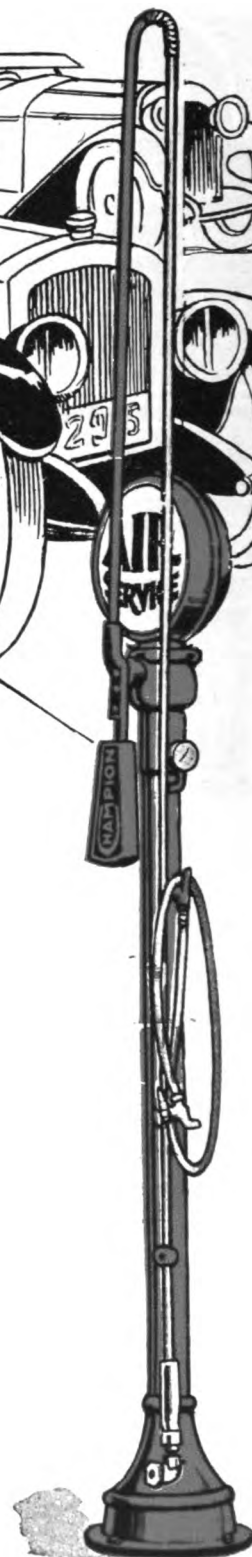
CHAMPION PNEUMATIC MACHINERY CO.

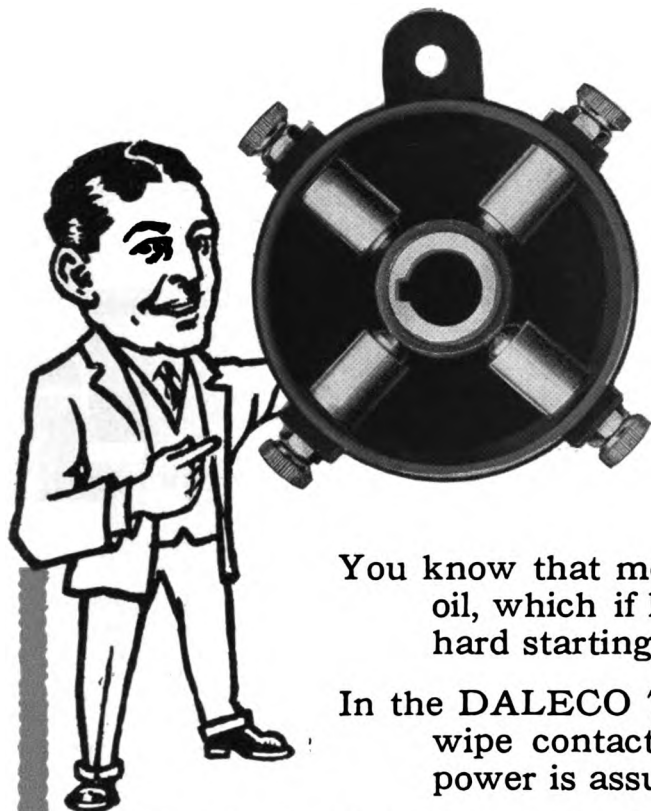
1400 S. Michigan Avenue, Chicago



CHAMPION AIR COMPRESSORS

serve best because they are built best, embodying many special features including valves of mushroom type housed in bronze cages; annular ball bearings; automatic pressure release causes motor to start against no pressure. They require a minimum of attention and are most economical to maintain. Made in many types for all requirements.





Let's Elucidate

You know that most all timers put on Fords fill with oil, which if left to gather on the contacts causes hard starting and a weak spark at all times.

In the DALECO Timer this oil film is broken by the wipe contact and a quick start and maximum power is assured, even in the coldest weather.

You know that iron, steel and similar metals are poor conductors of electricity, and are not used in high grade electrical apparatus, though they make up all or part of the electrical circuit of practically every other timer for Fords.

In the DALECO the current passes only through copper and brass the best conductors, thereby insuring an intense hot spark that instantly ignites and completely burns the gas, giving maximum power and minimum gas consumption.

You know that many of the timer troubles are due to short circuits or current leaks through the metal case.

The DALECO case is Bakelite, or Condensite, a material that is absolutely a non-conductor of electricity, therefore absolutely **shortproof**. This material is that used for distributor cases, etc., in highest grade magnetos and distributors.

You know that practically all other timers require oiling, care and attention.

In the DALECO there are no moving parts that require lubrication. Therefore, all you need to do is to properly install a DALECO and let it alone.

You know that the limited space of this advertisement prevents telling you ALL the built in qualities of the DALECO, or the two year Guarantee that insures perfect ignition service at fifty cents per year.

See the dealer and let him show you, or ask the Ford Owner who has one.

Manufactured by
DALE MANUFACTURING CO.
1323 Michigan Ave.
CHICAGO, ILLINOIS

Sales Department
THE ZINKE COMPANY
1325 Michigan Ave.
CHICAGO, ILLINOIS



Your customers will find a new pleasure and comfort in driving their Fords when they have a straight track ahead of them for the wheels to follow.

The "Steerite", attached to the tie rod and axle, automatically controls the steering apparatus. It prevents accidents in case the steering apparatus breaks, acts as a shock absorber to the entire front of car, and relieves constant strain to keep the car on "a straight and narrow path."

The "Steerite" allows full turning radius of the car, and without straining the steering apparatus. Takes up side motion of front wheels, thus giving about 20 per cent more wear to tires. Keeps radius rods from bending.

Seventy-five per cent of accidents to light cars are caused by steering gear control. You can offer your customers a real insurance against these accidents in "Steerite."

A few desirable territories are still open for dealers and agents. Every Ford owner is a prospect for this all-year-round seller.

**Write
for
details**

STEERITE STABILIZER CO.

3rd and Walnut Sts.

243 Insurance Exchange Bldg.

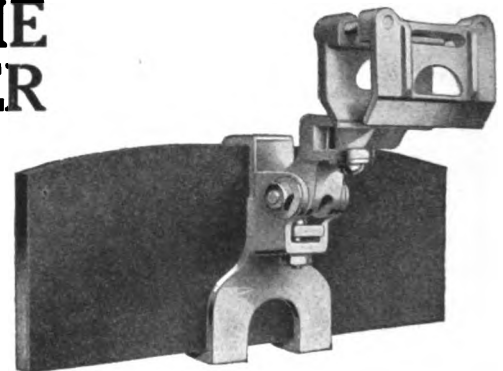
Philadelphia, Pa.

**Retails
\$3.50**

REPEAT ORDERS PUT THE CHIEF AUTO MIRROR OVER

Every dealer, jobber and car distributor who is selling this Quality Mirror has come back for more—so will you.

The Chief Auto Mirror stays sold on its merits. Carefully constructed and finished like a piece of jewelry, it sells on appearance as well as utility. The mirror is the finest quality French crystal with the silvering protected against the elements by a patented chemical process.



Model A—Style No. 1—Oval, 8 x 2 3/4"

Made especially to fit the center windshield frame of all touring and open cars. Faces the driver for rear or side views. Reversible with windshield open or closed or top up or down. The lock-clamp will fit any universal windshield frame, oval, round or square, and holds securely.

Price, \$5.00

Chief Mirror brackets can be easily adjusted to any angle and stay put. Every bracket is interchangeable.

JOBBERs and DEALERs are enthusiastic over the sales possibilities of this wonderfully attractive line of mirrors. If you haven't received a copy of our catalogue write for it now. We will supply direct all dealers whose jobbers do not carry the line.



This trade mark protects the dealer against substitution and guarantees the Chief to the owner.

BRITTON AUTO PRODUCTS CO., Inc.

118 West 63rd St.

New York City



When You Shave Yourself!

HETE-PRUF

Trade Mark

When you shave yourself do you realize that wonderful edge and temper of your favorite razor is purely the result of heat treatment of the steel?

A piece of common hoop iron can be made just as sharp but it will not stay that way, not even a minute, it is not heat treated.

The particular qualities of strength, temper, elasticity or hardness that we find in various steels and irons are entirely due to heat treatment.



The ONLY Piston RING guaranteed against warping or loss of tension through heat.

We have perfected a patented process of heat treatment for cast iron that enables us to produce a piston ring that bears the same relation to other rings that your razor does to the piece of hoop iron, that is they hold their form and tension throughout the life of the motor and are the only rings ever made that will do so.

Write our Sales Department for full details on HETE-PRUF superiority.

Manufacturers
LEESEBERG MACHINE & MFG. CO.
Fostoria, Ohio

Sales Department
THE ZINKE COMPANY
1329 Michigan Ave., Chicago, Illinois

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, *Editor*

Contents

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| "Courtesy and Service to the Public"..... | 9-10-11-12 | Finding Profits in Your Storeroom..... | 27-28 |
| From a small beginning in an old barn to a splendidly located and modern establishment which expects to do a million-dollar business in 1922 is "some" growth, yet that is what the man in C. D. McNamee's article did—"Courtesy and Service to the Public" his slogan. | | In this concluding installment of Gustav H. Radebaugh's article on storeroom practice, he describes some helpful shop record forms that have proved practical. | |
| A Day's Worth from Each Holiday..... | 13 | Some Business-Stimulating Ideas..... | 29-30-31 |
| "Why not make your holiday yield a full day's worth?" asks Ruel McDaniel, and then he tells of a number of unique and effective "sales stunts" that automotive dealers have used to take advantage of holiday trade. | | Massachusetts merchant rents wrench set to motorist and finds it is a good advertisement—Novel copy ideas which accessory dealers have found good advertising—Collection letters that collect the cash. | |
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| J. Newton Boddy, C. P. A. (N. A.), in concluding a series of articles on garage accounting with an article on daily balances, trial balances, profit and loss statement and balance sheets, asks for questions on the completed series. Send them along. | | H. J. White and Lowell R. Butcher present the approved methods for curing in tire repair work and tell how best results may be obtained. | |
| A Shop that Specializes in Tires..... | 15-16 | Welding, Cutting and Brazing Practice..... | 34-36 |
| H. T. Paulson tells of a successful dealer who has specialized in tires, tubes, tire incidentals and tire repair service—and he voices again the opinion so often stated in articles published in the AMERICAN GARAGE AND AUTO DEALER that "most important thing" in his business success has been "Service." | | This article, by David Baxter, is devoted to a discussion of expansion and contraction as it applies to the main run of automobile repair work where-in gas-welding torch is employed. | |
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| In which A. F. McCarty presents the application of the law in the case of the return by a customer of goods which have been made to order. | | Orin Crooker tells of an interesting and successful experiment by a Kansas garageman with overhead carriers. | |
| Legal Rulings of Interest to the Garageman..... | 21 | "Seen and Heard in Garages"..... | 42 |
| R. R. Rossing tells of various rulings which the courts of different states have made and which affect problems arising in garage work. | | James F. Hobart describes some practical methods that are being used by different garagemen which some of our readers may not have tried and which may be found helpful in shop work. | |
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| Current comments and observations by the Editor. | | In this department, we publish each month practical, "tried-and-true" kinks which readers have used in their shops and are passing along for the "other fellow's" benefit. | |
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| J. R. Bayston outlines the care of the various parts of the generator and gives methods of operation and care of the starter. | | Perhaps you have some repair job to do, about some part of which you are not certain what is the best method to use. This department will gladly publish the opinion of a technical expert on the question if you will just send it in to us. | |
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| J. N. Bagley tells a very interesting story of two men who began work in the same shop and brings out a good business principle most effectively. | | The new things in the automotive accessory world are described and illustrated in this department. It pays to keep in touch with the automotive accessory field, for your customers will be calling for many of these items. | |
| | | Up-to-the-Minute Garage Equipment..... | 62-64-66 |
| | | How about that shop equipment you planned to install to meet the demands of your summer trade? You will find many of the best tools made described in this department. | |

AMERICAN GARAGE & AUTO DEALER, Inc.

116 South Michigan Avenue, CHICAGO

J. R. HASTIE, president and treasurer.
H. D. FARGO, vice-president.

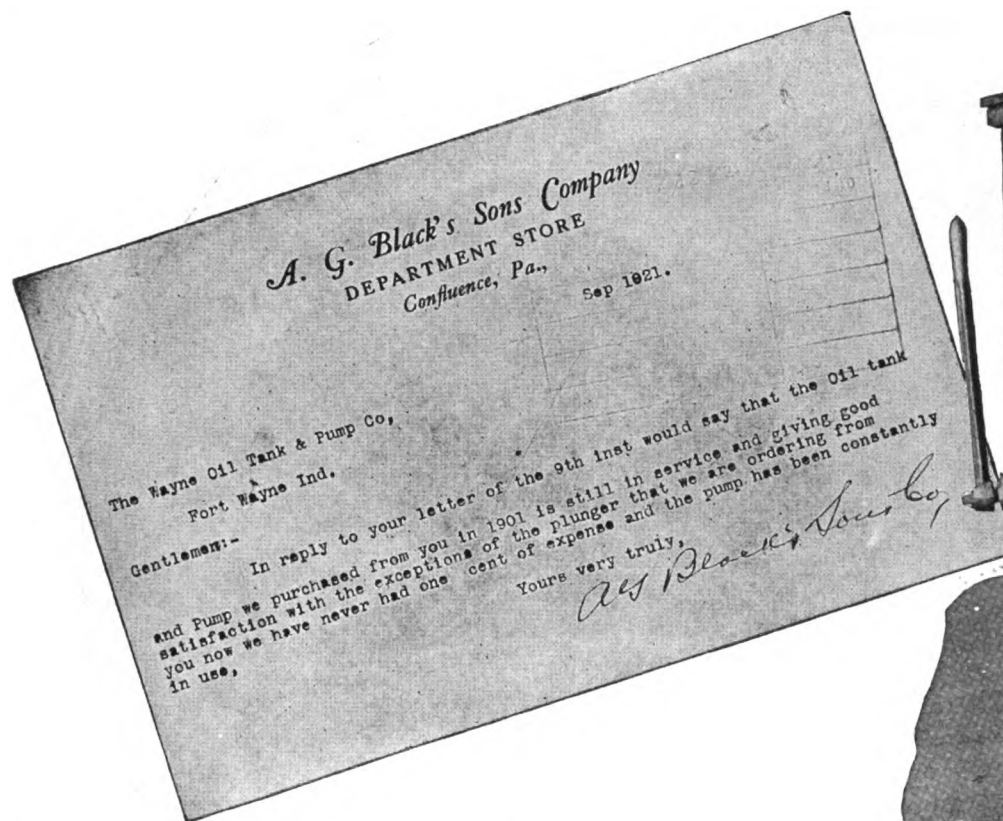
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S. R. EDWARDS, secretary.

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A. Q. GORDON, Manager, Cincinnati Office, 57 Atlas Bank Bldg., Cincinnati, Ohio
H. D. FAROO, JR., Manager, Chicago Office, 116 S. Michigan Ave., Chicago, Ill.
FRANK R. SCHALCK, Manager, Los Angeles Office, 1601 Campus Road, Los Angeles, Calif.

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Postoffice Entry—Entered as Second Class Matter March 1, 1916, at the Post Office at Chicago, Illinois, under the Act of March 1, 1879.



Twenty Years of Service Without a Cent for Repairs

Back in the year in which Theodore Roosevelt succeeded the martyred McKinley, A. G. Black & Sons Co. installed a Wayne Gasoline Pump in the company's general store at Confluence, Pa.

That was in 1901, a time when automobiles were still a novelty which could "never replace the good old horse."

Today this early Wayne Pump seems crude by comparison with the modern curb gasoline pump. But it served nearly a quarter of a century before a

cent had to be spent on it for repairs—a truly enviable record.

But this is not unusual. From the first, Wayne Pumps have been built to live to a useful old age. Improved by the experience of years of pump making, they are even better now.

There is one explanation—quality. In first cost Wayne Pumps are not the cheapest. (Quality merchandise seldom is.) But where value is measured in terms of long and satisfactory service, Wayne Pumps are the choice of prudent buyers.

Wayne Tank & Pump Company, 774 Canal St., Fort Wayne, Ind.

San Francisco Office: 631-633 Howard Street.

Canadian Tank & Pump Co. Ltd., Toronto, Ont.

An International Organization With Sales and Service Offices Everywhere

REG U S.
Wayne
TRADE MARK

WAYNE MAKES

Measuring Pumps

Storage Tanks

(From 20 to 20,000 gals.)

Air Compressors

Oil Burning Systems,
Furnaces and Forges

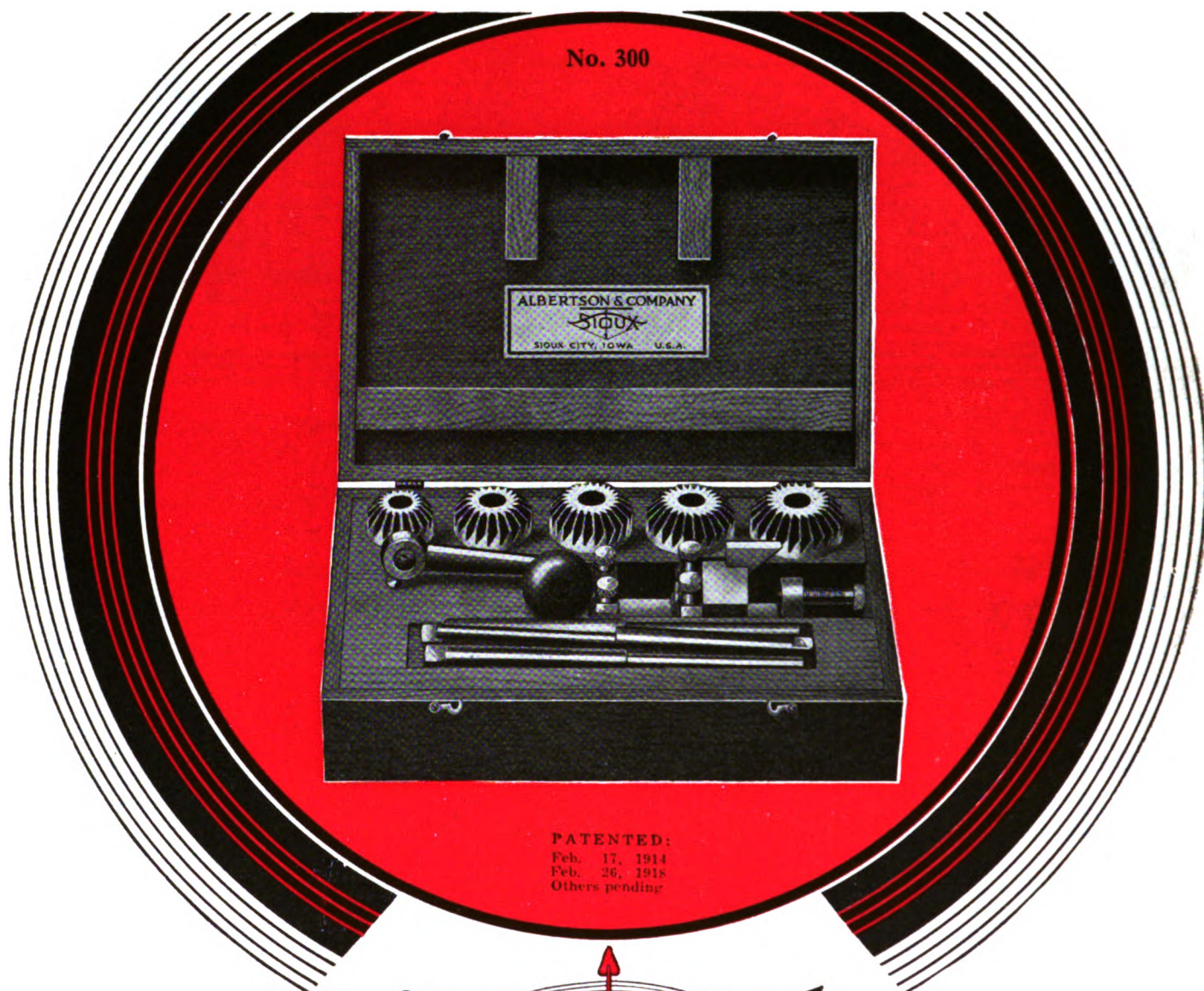
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AND

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HONEST MEASURE PUMPS

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



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SIOUX

TOOL SET

A time-saver, labor-saver and profit-raiser.

You can accurately seat the valves of any standard motor with this outfit and do away with hours of grinding. Valves properly seated require only a few turns of the grinder.

SIOUX SERVICE Keeps the reamers and cutters sharp at no cost to you except carrying charges. When reamers or cutters get dull send them prepaid and direct to us with return postage and they will be sharpened and returned the same day received. We maintain a special department for this service. Demand Sioux Tools if you want Sioux Service.

Jobbers Everywhere Sell Them

ALBERTSON & Co.,

SIOUX CITY, IOWA

American Garage & Auto Dealer

*A Business Paper Exclusively for the "Small-Town
Automotive Trade*

Vol. XIII. No. 6.

CHICAGO

JUNE, 1922

"Courtesy and Service to the Public"

Is Slogan Adopted by Michigan Company—From Beginning in Old Barn Eight Years Ago to One of Finest Garages and Salesrooms in Western Michigan Its Record—Attributes Growth to Application of Modern Business Methods

By C. D. McNamee

Eight years ago Frank E. Hathaway started in the automobile sales and service business in Muskegon, Mich., with practically no capital. An old barn was pressed into use as the service and sales station. Today Frank E. Hathaway, Inc., has one of the finest garages and salesrooms in Western Michigan and, with a capital of \$250,000, expects to do a million-dollar business in 1922.

What are the causes of this remarkable growth has often been asked. There are many causes, but they can probably be best given in the statement: Service, in all that it implies, and the adoption of the same business-like methods from the start as are applied in the operation of a modern department store or a great factory organization.

Hathaway decided, eight years ago, that the retail automobile business was destined to become one of the greatest of the industries with a remarkable future if modern sales methods and business ideas were applied. He applied such methods, with the result that the business has doubled every year and every department has shown a profit during that period. First of all, Hathaway had great confidence in the future of the business. He was sold to it.

"What we have done from a small beginning can be done by hundreds of others who are selling cars and operating service stations today," says Hathaway. "I do not mean to say that every concern could reap the profits that we have during eight years,

for the field might be restricted, but the business can be placed on a paying basis and the receipts increased yearly if modern business methods are applied."

"Courtesy and service to the pub-



A Real Genius for Organization a Contributing Factor to Frank E. Hathaway's Phenomenal Success.

lic" is the slogan of the Hathaway company. It is the application of this principle that has brought about the remarkable growth.

The spirit of the slogan predominates the entire organization, while the public has become boosters and Muskegon looks upon the business with civic pride. The new and modern home of the company was built after

long study by Hathaway, and every detail was the result of personal study. During all that time he had one thought in his mind. It was how best to furnish service to the public, realizing that, if he was successful in this effort, it would bring returns to the company.

One cannot enter the Hathaway building without being at once impressed with the desire of the company to give service. Take the instance of the tourist trade. Muskegon is on the West Michigan Pike, over which thousands of tourists travel yearly to the "playground of the United States," as it is now called. Hathaway decided that it was up to the company to go just a little bit farther in giving service to the tourists than his competitors. The result is that every convenience of the tourist has been considered and the Hathaway garage is known to thousands of summer visitors.

The tourist arrives in Muskegon. If he goes to a hotel, he is directed to the Hathaway garage, for there early developed the spirit of co-operation between hotels and the garage. The hotels realize that improved garage service will bring more business to Muskegon, while the Hathaway company knows that good hotel accommodations will bring more business to its station.

The car goes to the service station. The driver blows the horn, a workman presses a button, and the doors are automatically opened. He drives into the garage and, as he does so, he is greeted by the head of the service

courtesy department. Just to the right of the entrance is an office bearing the wording: "Service Courtesy Department—Mr. Mathews." If the tourist desires only storage for the night, the car is quickly run to the basement by the tramway, there being room for 200 cars.

The tourist may arrive during the day for repairs. If so, the price of the work is given at once, all work being on the flat rate basis. The women in the car are invited to the tourists' room on the second floor. Here is found a rest room for the women, where one can wash and enjoy the conveniences of the home, even to the lounge for those who are ill or seek rest. Writing tables, with stationery supplies, are provided and a bureau of general information is conducted.

This information bureau is in charge of a young lady who also looks after the telephone exchange. Information as to trains, boats, hotels, roads and various other things is quickly given, while pamphlets are distributed regarding the resort country.

Again, it is possible that the women in the rear seat of the car are cramped

by suitcases which have been piled in to the automobile. It is the business of the sales department to notice these things and walk out with a suitcase rack and demonstrate it. The sale is not to be forced. Many times the

the public. The telephone girl is expected to win friends for the company by her replies. The various departments know that, by being courteous to the public, the sales of the company will be increased and there is no place in the organization for the employe who does not give this extra service. He soon finds that he is a misfit in the organization.

This desire to accommodate has been carried even farther in handling the local trade. The Hathaway company found, early in its business career, that the one desire of every car owner is not to have his machine in the garage. He wants it as quickly as possible, and this resulted in the Hathaway accommodation service.

If a car comes in with a front axle

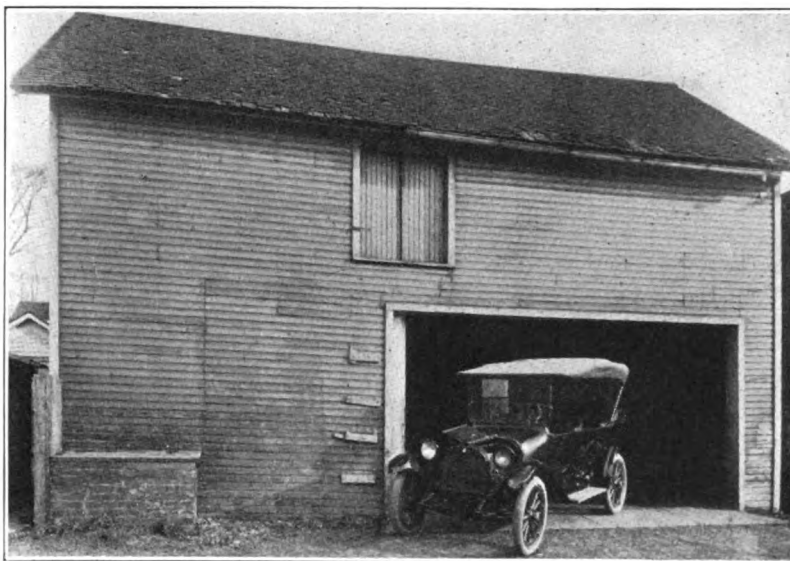
to be straightened, one from stock is placed in the car until the repairs can be made on the other. The same is true regarding rear axles. The result is that local car owners find that they do not have to place their car in the garage for any length of time to obtain repairs and overhauling.

This service department must bring the business to the sales department. If the Hathaway service department gives just a little bit more in the way of accommodations to the car owners than a competitor, friends are won and it means more sales, because the better the garage service given, the more money there is from the car owner.

The business is divided into seven departments: 1. Sales of new cars; 2. Used car sales; 3. Service department; 4. Car parts; 5. Battery department; 6. Accessory and supply department; and 7. Storage.

All departments are under one head—a central accountant—but there is also a man in charge of every department and he has control over all the employes in his division. He is held responsible and is given the co-operation of the entire organization. This plan has worked successfully and, if one department shows a falling down in business, the fault can be quickly determined and the remedy applied.

There is quite a keen competition between the departments. Sales records



Temporary Service Quarters, Muskegon, Mich., Where Frank E. Hathaway's Prosperous Automobile Sales and Service Business Was Started in 1914.

salesmen find that the automobile owner especially desires some of the little conveniences for the car, but has not happened to see what he wanted or has neglected to make the purchase. This helps to show a marked profit in the accessory department.

Every employe of the Hathaway company has been drilled in the thought that he must be courteous to



Muskegon Is Proud of This Testimonial to Eight Years' Remarkable Automobile Business Growth—"Courtesy and Service to Public Did It," Says Hathaway.

of the departments are given careful study and every recommendation of a department head, or even an employee, is given careful consideration. The result is that the employees are constantly working to improve the service and suggesting changes that will bring more profits.

Every department must stand on its own feet. It must bear its portion of the overhead and yield a profit. A recent survey showed that next year the car-parts department would pay all the overhead of the entire organization and, as the car sales increase, the profit will increase in this department.

"We long ago adopted the flat price policy for the garage," said Hathaway. "It is the only fair method. Under the old plan workmen were always making a low estimate and, when the customer received a bid for \$25 after it was announced that the work would probably cost \$15, he went away with a bad taste in his mouth. Then, under the flat price plan, the management will naturally go a little bit farther in seeing that the business is efficient."

The company broke all records during the last four months for sales of new cars. The reason for this was because, during the business depression, which was especially severe in Muskegon, the sales force prepared for the good days to come. When the good times arrived, the company reaped the profits.

During the days of the depression the district was divided into zones. Practically a house-to-house canvass was made and every prospect for a car was listed. The resources and credit of the various prospects were studied and advertising was sent to the homes. The result was that the prospect was really sold to the car long before he was ready to purchase. Other sales forces lost heart during the depression, because the ready money was not coming in immediate sales.

So, when business reopened, the Hathaway sales-

men did not have to go in search of prospects. They were out selling the prospects without delay, while the buyers came to the offices, having already been sold to the car. The rival sales forces had to go out and obtain the prospects and, in many cases, it was necessary for competitors to train a new force, as the depression had caused a disorganization.

The Hathaway company sells only one make of cars. It has tried handling more than one line and found this a failure from a business standpoint.

"To obtain the greatest success, you must concentrate on one line of cars," says Hathaway. "We have proven it in dollars and cents. Some hold that if you have distinct sales forces a success can be made. I do not believe it.

"If you are selling a high-priced car and a medium-priced car, the percentage may be the same, but you will naturally look to the sales of the high-priced car because it yields the greatest immediate returns. It is on the salesman's mind and goes through the entire organization. Again, I hold it is not fair to divide your capital for, if you do, you slight all the makes you handle and do not give the public the service it is entitled to have."

Hathaway gave more than two years of study to the construction of a new business place before work was started. He worked out every feature in connection with the new establishment. Special study was given to the little details that count for so much. The salesroom, for instance, was finished in a light tile and the entire plan is arranged so as not to detract from the

car itself. Hathaway contends that this feature is too often overlooked and that it has a marked effect on the customers—especially if they are women. At the Hathaway salesroom the car stands out and, in looking at the room, one does not first admire the beauty of the place, but the beauty of the cars.

Special lighting fixtures were obtained with the idea of setting off the cars, not the room. By giving his personal attention to the details, Hathaway was able to obtain low figures on many of the items of construction. Materials were contracted for during the time prices were low, saving thousands of dollars.

The Hathaway establishment is located at the intersection of Western Ave. and Fifth St. in the heart of Muskegon's business district. But the salesroom was not placed at the corner. The corner was given over to the accessory store because Hathaway knew that an oil station was to be placed across the street, and he desired that the thousands of motorists who drove to the filling station be attracted by the accessories. Once in the accessory department, wide doors open directly into the salesroom and the prospective customer will naturally be attracted to the cars.

In connection with the policy to give the quickest service possible, the concern employs its own body expert. He was obtained from a body factory and cars badly demolished are quickly repaired in the Hathaway plant.

The stockroom is located on the second floor. There was a time when the

concern had much difficulty with its stock. A customer would inquire regarding a part, and it was known that it was in stock but it took time to locate it. The customer was often asked to return in half an hour to give an opportunity to locate the part, while the workman lost the time.

Now the customer goes to the second floor, where he tells



An Interesting View of the Salesroom of Frank E. Hathaway, Inc., Muskegon, Michigan.

what part he desires. The girl looks on the perpetual inventory, gives the man in the stockroom the number, and he goes to the drawer and gets it. No time is lost. If the customer does not know the name of the part, there is a revolving rack at his disposal giving the names of all the parts in the car. No stock is damaged and there are no unnecessary delays, while the customer is given prompt service.

One girl handles the cash for both the service department and the accessory store. The cashier's office is located between the store and the service department, making it possible for her to serve both departments without loss of time.

The Hathaway company has no difficulty in disposing of used cars because of its policy. In taking a used car, the company gives the price it believes the car will sell for, less the cost of reconditioning and commission. The used car is then placed in first-class shape.

"Most used cars are purchased by people who do not have the money to buy a new machine," explained Hathaway. "They usually pay all that it is possible for them to spare monthly. They are not able to buy new tires or make other repairs the first few months, and should not be required to do so. Our used cars must be placed in good condition."

The used-car policy has brought plenty of business to the Hathaway company and has solved the used-car problem.

The Hathaway company carries out the same policy toward its employees as it does toward its customers. For instance, among the features which the company has introduced for its employees' benefit are shower baths for the workmen and on hot days the men take several baths. They do better work as a result.

The new Hathaway building could have been constructed for \$50,000 less and would have looked the same, but plans were made for the future. The construction is such that at least six more stories can be added to the building. The entire basement is used for storing cars and the space under the sidewalk is utilized, giving increased light, more space and keeping the ice and snow from the walk during the winter.

Muskegon is proud of the Hathaway building and it is recognized as a civic asset.

PENLINGS FROM THE PEN OF DIKE.

500 Shines—5,000 Cigars Daily.

Howdy Do and Thank You Did It.

Walk along West Main St., out in Oklahoma City and the first thing that attracts your attention is a stream of men and women going into a small store. You wonder what they sell, and you look up for the sign. You see: "100 Per Cent American." If you are a stranger, you may think it's a new drink or a hair tonic guaranteed to make hair grow on a billiard ball.

But, as you follow the crowd, you find out you are entering a cigar store and shoe shining parlor owned by Edna Wright—the Oklahoma City "Girl of Shunshine," no matter if you just walk in for a shoe shine.

She greets you with a "Howdy Do"—one of the kind of "Howdy Dos" that comes from the heart, not one of the kind that is manufactured like Lydia E. Pinkham's Pink Pills For Pale Folks but a dyed-in-the-wool "Howdy Do." When you make your purchase, it is "Thank You!"—not said mechanically but the kind that says "I am glad you came here."

I watched an old man stroll in. He wanted a penny box of matches. It was "Howdy Do," and when he had made the one cent purchase it was the same "Thank You!" as if he had purchased a ten-dollar box of cigars. I followed him out and asked him why he bought that box of matches there. He said: "I walked three blocks to hear Edna Wright say 'Howdy Do' and 'Thank You!'"

I went back there and bought a sack of Bull Durham—my wife doesn't like for me to use tobacco—and it was "Thank You!" I thought: "I will catch her now," and so I said "Package of Camels." It was "Thank you!" right out, just like it came from the bottom of her shoes.

As the crowd moved in, each woman and man received the same treatment. I watched for a chance to ask her to what she laid her business success. Here is the way she summed it all up:

"I try to make each one feel that he is the only customer I have had that day. I act natural. No matter what the amount of the sale, I give them the best attention possible—be it one cent or ten dollars.

"In five months, I have built this business up to 500 shines a day and 5,000 cigars. 'Howdy' and 'Thank you!' did it—meant from the heart. None of my helpers can stay here five minutes unless they are human and say 'Thank you!'"

Mr. Garageman! Mr. Automobile Dealer! Try this on your own business and, like Edna Wright's place, the crowd will beat a path to your door.

Dike says: Try it one week and you will use it always—"Howdy Do." "Thank You!"

* * * *

Ads noticed on tire dealers' service cars out in Kansas:

One read—"Invite us to your next blowout."

Another read—"We have a tire for every purpose. At a price for every purse."

A filling station in Oklahoma had this sign out—"Come and gas with us."

Another tire sign read—"We put 'em on. You wear 'em off."

* * * *

The good old nickel cigar is back;
We know the war is over.
The tourist speeds along the road,
The garageman is again in clover.

* * * *

Ninety per cent of the folks who pass your store or garage are interested in motor merchandise. Are your windows clean and inviting?

A motorist said the other day—"I trade at this garage because they always have ice water."

* * * *

There are two kinds of automobile merchants—the leaner and the lifter. In which class do you qualify?

A Day's Worth from Each Holiday

Holidays May Be Utilized to Good Advantage by Wideawake Automotive Dealer for Special Sales Stunts—Some Plans Dealers Have Used and Have Found Effective—Why Not Plan a Special Sales Stunt for Labor Day Trade?

By Ruel McDaniel

Do holidays mean only days of rest and inactivity, or are you getting more than a day's worth from each of them? There is a real feature connected with every holiday in the year for the automobile dealer if he will look about and utilize it. The difficulty the wide-awake agency has is the matter of deciding which of several sales stunts is the most effective.

The Reo-Scharfenstein Motors Co., of New Orleans, recently produced a striking example of what can be done in connection with Washington's birthday and the memorable hatchet made famous in relation to the cherry tree. As a result of a special advertising feature it put on that day, the agency sold at least 15 new Reo automobiles during the 45 days following that particular holiday which, as likely as not, it never would have sold otherwise. Of course, the sales cost something but that is expected. The main thing is to make a legitimate sale at a profit.

It so happened that Washington's birthday came soon after F. W. Scharfenstein had bought out the Reo agency in New Orleans and, in searching about for an out-of-the-ordinary stunt to draw attention to the fact that the agency had changed hands and was being conducted on a "live" basis, this holiday idea slapped the new owner right in the face. Here is what he did:

On Sunday, before Washington's birthday, which came on the following Wednesday, the agency inserted advertisements covering four full columns in the daily papers, offering to give a receipt for \$50 to every person who called in person at the showrooms of the company on Wednesday, February 22. The receipt was redeemable only when applied on the purchase of a new Reo automobile, and must have been used prior to April 1.

The advertisement was headed with these words: "Here's Our Way of Celebrating Washington's Birthday." Then directly below, with the amount of money featured, was: "A Receipt for \$50 Will Be Given to Every One Who Calls at Our Show Rooms on

ENTERPRISE MACHINE WORKS

Edwin Kilburn, Manager
Spring Valley, Minnesota.

June 3, 1922.

The American Garage & Auto Dealer,
116 South Michigan Avenue,
Chicago, Illinois.

Gentlemen:

We duly received your letter of May 22 together with the copy of the May issue of your journal which you sent under the same date.

I have given your publication a very thorough examination and am pleased to state that the appearance of this sample copy is very satisfactory, in fact, so much that you may enter my subscription for two years beginning with the June, 1922, number. There was one little item in regard to remagnetizing Ford magnetoes which is worth more than the \$1.50 subscription costs to us. Not only that but the publication as a whole impresses me very favorably. You are cutting away from the ruts, it seems to me, which is always a good thing.

I have been a constant reader of automobile publications every since the first issue of the "Horseless Age" which used to be published in New York City, and in fact I used to be an early contributor to that publication. As you may readily infer, I am quite well beyond the youthful age and it is seldom that I enthuse to any great extent over any new publication or idea, but in this particular instance I have been unusually well impressed by your paper and am taking this opportunity to express my feelings regarding it.

You will find enclosed \$1.50 in payment of this two years' subscription.

Respectfully,
Enterprise Machine Works,
Edwin Kilburn, Mgr.

Washington's Birthday, February 22." Following this was an explanation of the manner in which the receipt was to be used.

Directly below the reading matter, in the center of the space, was an outline of a hatchet. At the end of the

handle was a small bunch of cherries and, under the cutting edge of the blade, was a pile of gold certificates and gold coins. Immediately under the pile of money and the hatchet the wording continued: "As Gold is the Standard of Value—So Is Reo," the word "Reo" being in extra heavy type.

At the top, and slightly to the left of the hatchet, in small type but so surrounded by white space that it was conspicuous, this reading matter was used: "Just as George Washington wielded the axe and felled the cherry tree, we're cutting down our profit on Reo cars—just for a limited time to commemorate the birth of our first president."

The remainder of the space was given over to quality talk, and a special box was designated for an appeal to professional men concerning the Reo business coupe.

Smaller advertisements were run Monday, Tuesday and Wednesday mornings, repeating the receipt offer. All the announcements specifically stated that no receipts would be given out except in person at the company's salesrooms, and on February 22 only, and further featured that, in order for the recipients to derive any benefit from the receipts, they must be used before the first day of April.

At about the same time that the big Sunday advertisements appeared, circulars repeating the offer were mailed to a small select list of professional men—mostly physicians—calling their attention to the business coupe and the receipt offer.

Results derived from this special holiday stunt were decidedly gratifying to the Reo agents. Dozens of prospective purchasers came in and requested a receipt. Some were doubtless more or less curiosity seekers, as is always the case where there is a chance of getting a little something for nothing, but a dealer can never tell just when the most erratic curiosity chaser will be transformed into a bona fide sales prospect also, the number of deeply interested prospective buyers

(Concluded on page 20.)

Accounting:

This Concluding Article of the Series of Garage Accounting Articles Which Has Covered a Period of Nearly Two Years Discusses Daily Balances, Trial Balances, Profit and Loss Statements and Balance Sheets—What Practical Questions Shall Our Next Series Cover?

By J. Newton Boddy, C. P. A. (N. A.)

Auditor, Accountant, Systematizer, Specialist in Automobile Accounting

The only difference between daily balances and the trial balance is the difference in frequency or, in other words, the daily balance is a daily trial balance. In the general ledger trial balance illustrated, you will not find all the accounts listed on the chart of accounts.

Notes receivable discounted, jobs in process, real estate, cash sales, payroll, labor, undivided profits and other accounts have been omitted. This has been done to shorten and simplify the form as much as possible.

The prepaid charges account covers all prepaid accounts which would be listed separately on the ordinary trial balance—insurance, rent, advertising, carrying charges, war tax, etc.

You will notice that the profit and loss account takes two lines, the first line being for profit and loss to beginning of the current month. On the balance sheet these two are shown as one amount.

This graphic chart requires little explanation. The quickest way to grasp the idea is to set up your own chart of general ledger accounts, fill in your own trial balance figures and work it out for yourself.

If you are not carrying a "cost of sales", estimate it and finish the form. You will be surprised at the ease with which you can arrive at a fairly accurate profit and loss statement and balance sheet.

To those who have not had a statement of assets and liabilities since the first of the year, the preparation of a monthly trial balance and monthly operative statement and balance sheet is suggested. Try it! You will not find it very hard but you will find it very interesting.

There is only one point to keep in mind in doing work—that is that balances are not carried over from one month to another in the operative or income and expense accounts. Start sales, expense, interest and discount accounts fresh every month.

Some may prefer the longer form trial balance showing merchandise and sales accounts in detail. This will increase this form about five accounts in

inventories and about eight accounts in sales, for the average garage.

Let us repeat last month's offer—send us your chart of accounts. We will arrange it for you, set it up in trial balance form, and show you how to work out a profit and loss statement and balance sheet.

Most bookkeepers believe the "trial balance" is *finis* in bookkeeping. Alone it means little—it shows that equal amounts of debits and credits have been posted. A bookkeeper may be able to show perfect trial balances every month and still his bookkeeping may be worthless. He may have assets posted as expenses and vice versa, or liabilities and income interchanged.

Generally speaking, no bookkeeping is better than poor bookkeeping. A trial balance of an accurately posted set of books will furnish a ready visual statement of current assets and liabilities, if cost of sales is carried daily.

In reality, the trial balance is only a means to an end—which is the operative statement and balance sheet.

Where "cost of sales" is figured monthly, an extra column is sometimes left for closing entries. This column would come between columns 3 and 4.

The balance sheet, a statement of assets and liabilities, shows "where you stand." The operative or profit and loss statement shows "how and why you got there." The supreme test of your bookkeeping system is the ease with which you can accurately prepare these statements.

This article concludes a series that has been running almost two years. Every article written in that period is open to new handling. There are many items that have never been treated except in a general way—such as new trucks and used trucks, battery department, radiator department, tops and bodies, painting, livery, motor bus, welding, consignments, financing, parking and oil and greasing stations, used car exchanges, etc.

Now the logical thing to do is to start at the beginning again with a new series and incorporate in it the new forms and ideas evolved since the

A Practical and Commonly Used Form for General Ledger Trial Balance.

A Shop That Specializes in Tires

This Man Handles Only Tires, Tubes, Tire Incidentals and Tire Repair Service—"Most Important Thing in Making Our Business a Success Has Been Service," He Says — Finds Personal Factor Important in Selling

By H. T. Paulson

The fact that business has been dull in most lines, and having a mighty hard squeeze in many, has not meant either dullness or squeeze to the tire-store business of Eastman-Ross & Co., who are located far out on the west side of Chicago.

Ross says their business is good and in 1921 differed from 1920 only in this: Whereas, there seemed to be an evenness in sales of tires in 1920, in 1921 sales seemed to bunch at times with quieter times between, maintaining, however, a good average. He accounts for this by saying that in 1920 people bought tires to have them on hand, whether they needed them at the time or not, but that in 1921 they bought only when the need was pressing.

Eastman-Ross & Co. have specialized down to tires, tubes, and tire incidentals. Their repair service is only on tires. They handle no automobile accessories and do no automobile repairwork.

"Our business," said Ross, "is made up of satisfied customers, who have become our accounts for their needs. What we want is repeat business. We have been in business right here for seven years and that is what we have worked for all the time. About 50 per cent of our business comes from the neighborhood car owners in the residence district about here, and about 50 per cent is in commercial accounts scattered over the city.

"We find that the most important thing in making our business a success has been service. When car owners are in trouble, on account of tire difficulty, they call on us and we have an opportunity to help them. We have a service truck which we keep available for the road all the time. If someone, who has had a blowout on the road and doesn't have the means along so he can start traveling again, calls us up we, of course, get the size of the tire and send our man out with a new tire on the truck.

"If the party wants the new tire put on and has the money along so he can pay for it, our man is there to put it on and make the sale. He will make

the repair if that is wanted and can be done there. If the tire is badly damaged and has to be vulcanized, and the party doesn't have another tire to put on, our man will bring it in, have it vulcanized and go back with it while



A Shop Which Specializes in Tires and Tire Service.

the party waits. It doesn't take long.

"We are the Chicago Motor Club service station for the district about here, and they shoot any calls they receive from this district about tire trouble, right on to us and we go out. These calls are generally from ladies. We send our service truck anywhere in the City of Chicago, or the west side suburbs, for a regular fixed charge of only 50 cents. If our man puts on a new tire on such a trip, we just forget about the service charge and charge the cost of the trip to the service account. The service charge we make doesn't pay the expense of the service, but the service makes us new customers.

"If a party has had tire trouble and our man has been out and helped him, what more natural than that he will give us his business? That's what happens. In this way, we get vulcanizing work and the chance for sales.

"Whenever our man does any tire work for a commercial account, he

makes a card record of the tire equipment he finds in use. This is valuable to us and we preserve this record. We then know what that company uses and what its needs are, and we keep in touch to get some business. We get new customers in that way.

"Our business is strictly tires. As part of our service, however, we supply gasoline and oil at the curb. We don't make anything on the gasoline, but it brings us customers to have this service. We want customers all the time, and for the things we do we want them to feel they can rely upon us for complete service. When we get them, we keep them by pleasing them and keeping them satisfied.

"Another place where we see the good results of the personal factor and the service factor is in our selling. We have one salesman who is out selling all the time, and my partner, Mr. Eastman, and I are out a good deal selling, but one of us, Mr. Eastman, or myself is always here at the store.

"We put our outside selling effort on commercial accounts. Sometimes our salesman will have an account lined up so that there seems to be no reason why he shouldn't give an order for tires, but he doesn't; he holds off. For one thing, it may be that he doesn't like to give his order to the man who has been trying to sell him. He may not just like the kind of personality he has.

"When the thing seems to be at a standstill Mr. Eastman or I will go out and call on the party and he will give us the business without hesitancy. It was just that he wanted to deal with another type of person. Yet, with another account, that salesman is just the one who is best suited to get the business.

"Again, we find that when one of us has been trying to sell a man and he has held off, a call on him from the other member of our firm, as a member of the firm, will bring the business. He appreciates the fact that the firm keeps track of his business and will take the trouble to go to see him personally. He feels that the firm really wants the business and is show-

ing him real attention in order to get it.

"We refuse to handle cheap tires. They wouldn't stand up and give satisfaction, and would lose customers. We can't afford to handle anything but good tires. When we sell a customer such a tire, he is pleased with the service he gets out of it and keeps coming back to us. We have his confidence. We handle three makes of tires for all cars, and 6-inch pneumatics and one make of solids of all sizes for trucks. We push pneumatics for light trucks.

"We don't cut prices. It helps business to maintain prices. The tire men's association has done a good deal to stabilize prices. This gives uniformity and equalizes the opportunity for business.

"Sometimes we make an allowance for a used tire, to apply on the payment for a new tire. Such used tires we put in good repair and sell them cheaply without guaranty when we have calls for them.

"We help our sales a lot by advertising, too. There are three local weeklies out in this district and we advertise in all of them. We run advertisements every week. A large part of our local trade comes from these advertisements. We have to keep ourselves before the public. We use coupons some in this advertising.

"About four times a year we mail advertising matter to our list of customers, too. We don't do much of that, though, as we don't want to appear to be doing a mail order business. We think there is a little stigma of cheapness that attaches to a mail order business and we want to avoid that. We use the mail just enough to keep up a direct contact with our customers.

"We usually have a good window display and that sells a number of tires for us. We think it is a big advantage to have a good front to the store.

"When it is all said, our best advertising is our satisfied customers. They boost us. Every once in a while a man comes to us and says so-and-so said he did business with us and told him to see us for his needs."

The office and sales counter at this store occupies a small amount of space running across the front of the building, partitioned off from the supply room and shop.

Ross is a quiet type of man, but it was clear from talking with him that

he knows his business and is attentive to it, is good-natured but firm, and patiently goes after what he wants. He has an optimistic belief about human nature that, if his firm treats people it comes into contact with right, they will reciprocate by giving the firm their business.

The store is open from eight o'clock in the morning to eight o'clock in the evening on week days, and on Sundays from nine to twelve noon to give the neighborhood customers a chance to fill up with gasoline and oil. The firm is a partnership, C. T. Ross being one of the partners and E. H. Eastman the other.

I was not done with Ross. "How successful are you in collecting the money for the business you do?" I asked.

"Our collections are good—not always fast, but we practically always collect. Last year we lost only one account. That company went through bankruptcy. The discounts we allow for cash bring in about 75 per cent of our money promptly on the tenth of the month. We give our commercial accounts a regular trade discount and we allow a 5 per cent discount for cash, to the general public, for all new material sold over the counter if paid by the tenth of the month following the date of sale.

"Yet the money was considerably slower in 1921 than it was in 1920. Some accounts run over as much as 30 days after they should have been paid. When we don't receive the money by the tenth, we still bring in quite a bit of it by writing the slow ones and extending the discount time some days after the tenth to have the account paid. That discount counts up and people like to take advantage of it. On the other hand, we have to get our accounts collected in order to be able to take advantage of the discounts on our purchases.

"We sell a lot on credit, of course. When anyone asks for credit we request references. We look these up and then use our judgment. We don't lose. There is also the credit bureau of the tire men's association if we want to use it."

"Do you have anything unusual in the way of records for keeping your finger on things and for convenience?" I queried.

"We have a card file on our tires that we think works well. We make

a card for every new tire we receive and enter on this card the number of the tire. These are filed numerically. When we sell a tire, we pull out the card bearing the number and mark on it the name of the purchaser, the date and the price.

"For tires sold over the counter to the general public, we also get the speedometer reading when the car is at the curb, and note that. This is for our own protection, so that if they come back later with a kick and say they didn't get service out of the tire, we can check up on them and show them what mileage they actually got.

"Quite a number of the purchasers complain a good deal and exaggerate strongly. We carry good tires and we know they give service. We want to be able to prove that they give service. We don't have that to contend with in dealing with commercial accounts.

"When a tire has been sold, we pull the card out of this file and put it into another file for sold tires. This card then becomes a handy reference. When a man who has bought a tire comes in for another one, we look up the card for his former purchase and the information about it is right there. These cards also become a part of our mailing list of customers.

"We save ourselves some work with regard to our purchase records, too, by using duplicate purchase orders which are numbered. We request that bills sent us bear our order number. Having this number as a guide, enables us to turn directly to our copy of the order to check against the bill."

"About how would you say your business divides up as to sales and other things?" I asked.

"Roughly, about 50 per cent is made up of sales—35 per cent from vulcanizing, and 15 per cent for other little items. We figure that our vulcanizing shop pays all the overhead of our business for about ten months out of the year, so what we make on our sales is 'velvet.' Our vulcanizing shop averages about ten tires a day. We do all kinds of vulcanizing, and on all kinds and sizes of tires.

"We have built our business up slowly but it is on a sound basis. We have built up customers and have a good repeat business, and that is the thing that counts. We have a following that we feel we can depend upon because of the satisfaction we have given them."

"Stunts" For Getting Attention

How Some of Our Progressive Western Dealers and Garagemen Have Very Effectively Introduced Unusual Ideas Into Their Advertising—One Vaudeville Star Who Was the "Center of Attraction" Off Stage as Well as On

By C. A. Goddard

Western dealers are not locked to precedent in their methods of getting the attention of possible customers. Where competition is at it hot and heavy, what one does to keep the name before the car owners is important.

There is a long bad road between Bakersfield and Saugus, Cal. There are many cases where the drivers are in need of a garage. To make sure that they will not forget the name, Suter's Garage, south of Bakersfield, Cal., has placed along the highway a number of large metal bulletin boards reading as shown in the illustration. The name can be seen by a car driver, even though his speed is double that allowed on the highway. The slogan, too, stays in the mind.

"Drops Hints" Frequently.

Candee's garage, of 1043 South Main St., Los Angeles, reminds car owners frequently of its service—the "help yourself" plan that has made the proprietor well known locally. This is done by means of little pieces of printed matter dropped into the cars while the owner is away.

To produce these circulars at a minimum cost, Candee uses his spare time and that of his employes about the place to set them up in type and to print them. Next to his counter he has a power-driven job printing press and there is always a form ready to print on the press. A little spare time,

a shift of the power belt, and a run of circulars is ready to be placed where they will do the most good.

"See the Judge" But—

A Western automobile accessory store caused some San Diego car drivers to do some thinking, recently. When they got back to their wheels on that day they found a forbidding little tag tied to it.

"Now, what do you suppose I've done?" the man would ask as the sight of the tag caused him to survey the car with an idea of finding what the officer had found wrong with it. Then he pulled up the tag.

"You are requested to appear—" He got that line on the one side in fine print, and turned the tag to get the name of the judge.

"At our store as early as you can conveniently come—if you are interested in ——— tires. We are stocking the ——— make and are closing out the brand mentioned.

Each week we have a special for car owners that is worth your noticing. Come in to see us. You never will be pinched through buying at our prices. And we'll let you be the judge as to our service, too."

It got the attention and a number of the men left the tags on their wheels just to get a joke on other men they met.

Parade of Vaudeville Star.

There came to Los Angeles one week one of those strong-teethed men who can hold heavy people suspended by merely holding the end of a rope in their vise-like teeth. C. W.



Unique Roadside Advertisement of California Garage.

McKelvey, an automobile dealer at 961 South Flower Street, got a hunch that here was a main chance for some publicity. He arranged with the performer for a demonstration on the streets.

Thus it was that the people were treated to a free performance. The strong man stood, or crouched, on the rear seat of one car and by holding the end of the towline in his teeth pulled a second car along the streets, amid the applause of thousands. Needless to say, the cars were properly placarded and the newspapers supplied with write-ups and illustrations.

One of the photographs taken of the car and crowd, reproduced on this page, tells the story in a nutshell.

ACCOUNTING METHODS.

(Concluded from page 14.)

last series was written. However, a little variety would do us all good and we will take up any specific item for which any of our subscribers ask.

We will try to answer all questions through the next issue, but if there are too many some may be answered individually in the current month and handled through the AMERICAN GARAGE & AUTO DEALER in a later issue. Don't be afraid to ask. Your name will not appear if you do not wish it used.

What shall our next article cover? This is your opportunity.



Pulls Car Through Streets by Towline, End of Which Is Held in Teeth

The Law, the Facts and the Garage

In Which Our Hero, Dealer Brown, Finds It Necessary to Consult the Law Regarding the Return by an Eccentric Customer of a Purchase Made to Order — He Is Loser in This Transaction But Wins a Later Argument

By A. F. McCarty

Elwood Brown, head of the Brown Garage & Auto Supply Co., happened — just happened — to look over his desk toward the driveway which ran beside the salesroom to the shop at the rear, and perceived, through the glass of the partition, a certain customer who had driven his car in and was inspecting seat-cover materials.

He was a man well known to Brown. His name was Thomas Devore and he was an inventor, the patentee of several articles from which he had grown wealthy. He was of eccentric disposition, hard to please and hard to sell to. Brown arose and strolled down to watch the progress of negotiations, but before he got there he observed that Nelson was writing in his order book, indicating that a sale to the difficult customer had been concluded.

"Are you sure you can have those covers fitted perfectly?" asked Devore of Nelson, the salesman.

"Yes, Mr. Devore, we have a splendid workman and he'll do a nice job for you."

"Well, your ideas of a perfect fit and mine don't always tally. Suppose they don't suit me?"

"We guarantee satisfaction, Mr. Devore," replied Nelson. "If the seat covers aren't satisfactory, you needn't take them."

Devore grunted something in reply and went out. Brown returned to his desk, searching in the back of his mind for the cause of the uneasy feeling engendered there by Nelson's sweeping guaranty, but he failed to find it and set the incident down as unworthy of further thought.

The order for the seat covers went to the shop, and the big shears started in to cut them out. It was a line which he was discontinuing, as the sales of seat covers seemed to have fallen off, but he kept prepared to fill orders.

It was three days later that Nelson came to Brown's desk, asking that he speak on the telephone to Thomas Devore about the seat covers ordered for his car—an obsolete model—and made up to order. It seemed that Devore had taken one look at the covers put

in place, and then had indignantly detached them and carried them back to the garage, saying they were not satisfactory.

When Brown got the inventor on the telephone, he asked what was the matter with the seat covers.

Reclaiming Wasted Time Is First Step Toward Efficiency.

Of all commodities time is the commodity that is most wasted. We say that "time is money" and then act as though time were valueless. Minute wastes of minutes and seconds by anyone and everyone in the organization have kept many a big business from crossing the profit line and paying dividends. The first step in the proper organization of a business is so to lay out its system as to effect the greatest possible saving of time. When we begin to save time we begin to save money. Cutting out wasted moments is the first step toward efficiency.—John Landis Browne.

"They are not satisfactory," replied Devore.

"Yes, I understand," said Brown, patiently. "But I'd like to know where they're wrong and we'll make it right."

"I said that the job isn't satisfactory. Isn't that enough?" persisted the eccentric man.

"Well, hardly, Mr. Devore. We try to please all our customers and want to in this case, if you'll permit us to."

"I have nothing further to say on the subject," retorted the plainly-irritated Devore, hanging up his receiver.

"I'll see if that old cuss can make a monkey of me!" exclaimed Brown, irate in turn. Then he put on his hat and left in a hurry for the office of George Updyke, the lawyer, where he poured his indignant story into that gentleman's willing ears.

"Caught you, did he?" asked Updyke.

"What do you mean?" queried the merchant.

"You should never never guarantee satisfaction with anything you sell,

Mr. Brown," said Updyke, "especially anything made to order, altered, or that cannot be put back into stock. Under that sort of a guaranty you have no chance if the customer decides, for any whim, to back out of his contract.

"You undertake to 'satisfy' him, and he is the only witness as to whether he is satisfied or not. Guarantee articles to be well made, free from defect—even a perfect fit if you must—for all those can be proved, but never guarantee to 'satisfy.'"

"Then I can't make him take those seat covers, nor collect for them?"

"No, you can't. That was tried out a long time ago in a famous case in which a tailor undertook to satisfy his customer. He did make a perfectly fitting suit of clothes and proved it, but the court held that so long as the customer wasn't satisfied, he didn't have to pay."

"Thank you, I'll mark that down for future reference," and Brown returned to his garage madder than ever. Arrived there, he took the telephone and barked a number. A voice said "Hello."

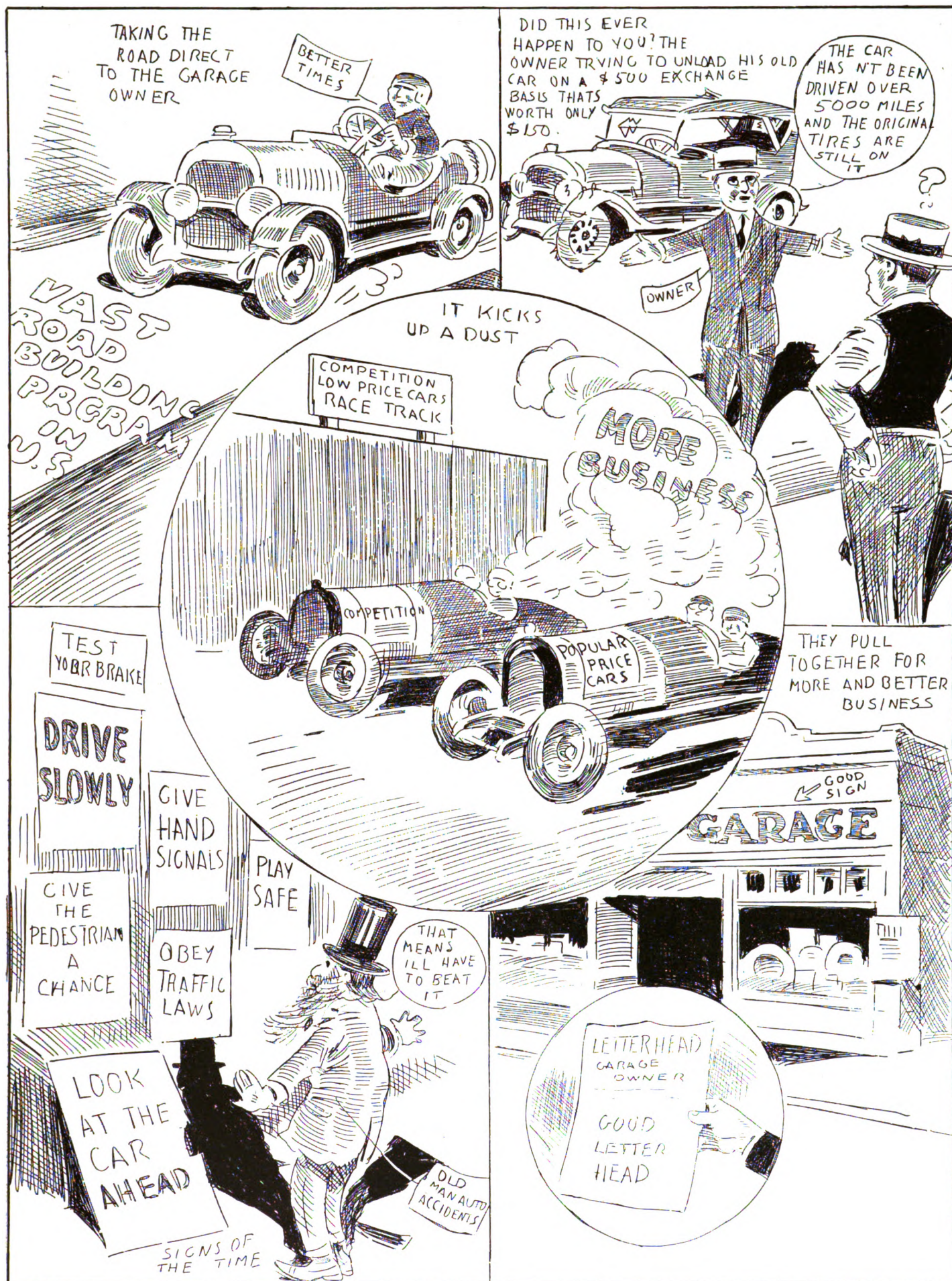
"Is this Thomas Devore? It is? Well, Mr. Devore, I want to say to you that your way of doing business does not accord with my ideas of fairness. We do not want any more of your business. In the future, kindly stay away from this establishment."

A sound reached his ear, indicating that the person at the other end of the wire was about to strangle. With a pleased smile on his lips, Brown softly hung up the receiver.

VI.

Maybe Brown was feeling a bit cocky that morning. Anyway he had some cause for looking upon the world as his oyster, for he had had a most refreshing night's sleep, had enjoyed a delectable breakfast and, best of all, his son, Lawrence, had just told him that upon conclusion of the law course he, Lawrence, would go into business with his father, a consummation Brown had long devoutly wished.

The exuberant feeling persisted and
(Concluded on page 20.)



THE LAW, THE FACTS AND THE GARAGE.

(Concluded from page 18.)

was still surging in his breast at mid-forenoon when, as he was strolling about his store, he perceived an individual, the sight of whom aroused the business man to immediate and positive activity.

It was Thomas Devore, who had ordered a set of seat covers made up for his car and then refused to take them on the ground that the undertaking of the garage to "satisfy" him had not been fulfilled.

Changing his course so as to intercept Devore, Brown stopped in front of that person, barring his further progress.

"Devore, didn't I tell you we didn't want any more of your trade?"

"Well, am I giving you any of it?" retorted the wealthy but eccentric inventor.

"I don't care whether you are or not or whether you are even thinking of giving us any of it. I also told you to stay away from here, didn't I?"

"Possibly you did, but it is my impression that this is a public place which the public is invited to enter. Don't your advertisements say so?"

"They do," replied Brown, firmly, "but that doesn't apply to you. I tell you plainly, Devore, you are not wanted here. Get out!"

"Oh, and what if I don't go?" taunted Devore.

"I'll put you out, and I'll do it darned quick if you don't get out by yourself!" exclaimed Brown, beginning to lose a part of the beautiful control he had shown thus far.

"You will, will you? Just try it and see what the result will be," ejaculated Devore, evidently baiting Brown for some purpose. If it was to get action, it may be said that it was accomplished for, with the last word, the garageman started with a rush that carried Thomas well toward the door. But he caught a toe-hold on something and, with his characteristic stubbornness, contested the issue.

The struggle was short. Brown got one firm grip on the collar of his wriggling antagonist, another in the slack of his trousers, and propelled Devore rapidly toward the door. Nelson was nearby and he threw the portal wide, and Brown, with a final shove, deposited the recalcitrant Devore on the sidewalk, so mad he fairly frothed at the mouth.

"I'll sue you for this, you—you—"

stuttered the ejected man, furiously.

"Sue and be damned!" shouted Brown. Then he laughed, dusted his hands and turned back into the store, feeling better, if anything, than before.

Thomas Devore did bring suit against The Brown Garage & Auto Supply Co., demanding damages for what he alleged was assault. When the case was called in court and the facts had been brought out, George Updyke, counsel for the Brown company, arose and addressed the bench:

"May it please the court, I desire to call attention to the rule, now of universal application throughout the United States and fully discussed in Volume 9 of American Law Reports, beginning at page 379, on the right of a proprietor to eject another from his place of business. It is now the settled law, your honor, that the implied invitation which it is said every business man extends to the public may be revoked at any time as to any person, and thereafter that person may not rightfully enter that place.

"If he does, he may rightfully be ejected, and if he resists, force may be used. If it has been made clear to him that the invitation is, as to him, withdrawn and he then enter, he should be told to leave, of course. That was done. The resistance in this case justified the force used which was only that required to accomplish the purpose of ejection. There was no assault, and I move the court to dismiss the case at plaintiff's cost."

"You are right in your statement of the law, Mr. Updyke," said the judge. "Your motion is allowed and case dismissed at the cost of Mr. Devore. Call the next case!"

A DAY'S WORTH FROM EACH HOLIDAY.

(Concluded from page 18.)

was far in excess of the other class.

The \$50 receipts were given to all those who called for them and—of more importance—every visitor was shown the new model Reo automobile, and its qualities and superiorities were explained in detail to them.

This will prove of value for months to come—at least, so thinks Scharfenstein—for it often works out that the car a person likes best of all is the car which he best understands. There are still millions of men and women in this country who are sufficiently well fixed financially to own automobiles but who know absolutely nothing about them. To these prospects a detailed demon-

stration and explanation of the workings of a car goes a long way toward influencing them to buy that particular car right then or later. The demonstration has its effect, whether the prospect buys tomorrow or a year hence.

Within a few days after the special sales stunt was put on, an analysis of the results gained showed that at least 15 cars were either sold or would be sold on the strength of the receipt idea. More important than the actual sales perhaps, the advertising put the prospective automobile buyers in New Orleans to thinking about the Reo car. When they get ready to buy a new car, even though the time for using the \$50 receipt has elapsed, what is to hinder them from recalling the Reo car advertising as a result of the impression made on them by this unusual holiday offer?

At first thought, it might appear that it is unethical, or at least bad policy, to sell new cars \$50 below the stipulated factory prices but, on further consideration, this stunt is nothing more than so much money applied to the advertising fund. Instead of allotting a certain percentage of the total receipts for advertising, the Reo-Scharfenstein Co. merely took off \$50 for each car sold. If the sale was not made, the advertising cost nothing. If it was, then they cheerfully paid the price of making it and still had a wide margin of profit left.

Automobile dealers will find this a regular business laxative, Scharfenstein declares and, even though Washington's birthday comes but once a year, there are numerous other occasions on which a similar idea could be used to advantage and at a profit.

In the first place, a holiday is an excellent time to get prospects to come to your salesrooms. They are perhaps not working on those days, and what is a better way of spending a holiday than going down and inspecting the latest models of some popular make of automobile—especially so from the wife's standpoint and she usually maps out the holiday program anyway.

What about a stunt similar to this on Labor Day? There are numerous state and even city holidays and half-holidays which could be utilized to advantage by just such an idea. Try one! Scharfenstein declares that the money spent in this way will bring big returns.

Legal Rulings of Interest to Garagemen

Rental Value of Car Basis of Measure of Damages for Loss of Use of Taxicab—Recovery Rights of Holder of Lien on Automobile Seized While Being Used to Transport Intoxicating Liquor—Other Rulings in Various States

By R. R. Rossing

Measure of Damages for Loss of Use of Taxicab.

Where taxicab was damaged, and owner lost the use thereof, the measure of damage for loss of use is the rental value of the car during the period required to make the repairs, and not the net average profit that the plaintiff would have made.—*Hastings v. Taylor*. Supreme Court of New York. 188 N. Y. Supp. 421.

Right of Mortgagee to Automobile Offered as Security.

One lending money on the security of a mortgage upon an automobile, which mortgagor purchased by issuing a fraudulent check therefor, stands in the relation of a purchaser in good faith, and will be protected against the seller's claims, where he had no knowledge of the mortgagor's fraud.—*Patterson v. Indiana Inv. & S. Co.* Appellate Court of Indiana. 131 Northwestern 19.

No Damages for Failure to Deliver Automobile Ordered by Dealer.

Under a contract between a motor company and an automobile dealer, whereby automobiles were furnished the dealer at a discount, no recovery of damages could be had by the dealer from the company for any loss or damage arising from its failure to deliver an automobile ordered, in the face of a clause in the contract providing that the company "shall not be liable for any loss or damage from its failure to deliver goods ordered."—*Standard Motor Co. v. Shockey*. Court of Appeals of Maryland. 114 Atlantic 869.

Lien of Seller Forfeited Under National Prohibition Act.

Under the National prohibition act, tit. 2, article 26, one who has a lien on an automobile seized while being used for the transportation of intoxicating liquor is not entitled to have the vehicle returned to him, and thereby be enabled to profit by the transaction, but is limited to a repayment of the amount of his lien from the proceeds of the sale of the vehicle.

Where only a small amount of the purchase price of a vehicle had been paid, so that the lien of the seller, who was ignorant of the unlawful use of the automobile, is substantially equal to the value of the vehicle, and the highest bid at the marshal's

sale does not equal the amount of the lien, the marshal should abandon the sale and report the facts to the court.—*U. S. v. Sylvester*. U. S. District Court, Conn. 273 Federal 253.

Accident Insurance Ruling in Case of Wrecked Car.

Provision in an accident policy to the effect that the insurer is liable only for the actual cost of repairing a car injured in a collision applies only in cases where the car can be repaired. It has no application where it is shown that the car has been reduced to a total wreck and is beyond possibility of repair.—*Center Garage Co. v. Columbia Ins. Co.* Court of Errors and Appeals of New Jersey. 115 Atlantic 401.

When Mechanic's Lien on Automobile Is Not Enforceable.

In a proceeding to foreclose a mechanic's lien on an automobile purchased by a minor—who had used and returned it to the seller's garage in a damaged condition and engaged a mechanic to repair it—the court held that the seller, having expressly notified the mechanic in advance that he would not pay for the repairs, was not liable therefor.—*Irwin v. Harbough*. Legros v. Culberson. Appellate Court of Indiana. 134 Northwestern 907.

When the Sale of Automobiles Constitutes a Conditional Sale.

When a manufacturer of automobiles drew drafts on a sales agent with bill of lading attached and the bank paid such drafts, transmitting the funds directly to the manufacturer and allowing the agent to take possession and resell the automobiles, it was held by the court that the transaction was one of conditional sale and not a contract for an equitable mortgage, notwithstanding that the sales agent executed a note for the advances; the bank reserving title.—*Sternberg v. City Nat. Bank of Ft. Smith*. Supreme Court of Arkansas. 233 Southwestern 691.

Dealer's Right to Make and Charge for Repairs.

Where an automobile dealer took the plaintiff's old car in exchange for a new one at a stipulated price, and agreed to sell the car for as much more than the stipulated price as possible and credit the plaintiff with the net balance after making

such a sale, the term "net balance" means the balance of the proceeds after deducting the expenses incident to the sale, so that the dealer is entitled to deduct from the sale price the cost of repairs necessary to effect the sale.

Evidence by an experienced automobile man that a used car could not be sold unless it was first put in running order is sufficient to show that the repairs necessary to put it in such order were necessary for the sale, so that the dealer was entitled to deduct the cost of such repairs from the sale price before crediting the owner with the net balance.—*Meserve v. Smith Bros.* District Court of Appeal, California. 206 Pacific 105.

Garage Keeper's Lien Superior to Chattel Mortgage.

Under the New York lien law, paragraph 181, a garage keeper has a lien for storage, maintenance, etc., on motor vehicles which is superior to the lien of a chattel mortgage given while such statute was in force.—*Bardasch v. Kalisch*. Supreme Court of New York. 193 N. Y. Supp. 719.

Garage Keeper Liable for Experiment With Oil in Coal Stove.

In an action by owners of automobiles against a garage keeper to recover value of cars burned, evidence that the garage keeper piped oil into the stove and upon the coals was held by the court to be sufficient to establish liability for the explosion and fire.—*Jordan v. Rieker*. Supreme Court of Washington. 205 Pacific 1043.

When the Sale of an Automobile Is Covered by Lien.

Where the owner executed a bill of sale of an automobile, but continued to use the automobile in his business and thereafter kept the automobile sometimes in his garage and sometimes in buyer's garage, the transfer was void as against seller's creditor.

The latter had advanced the purchase price of automobile and, the court held, was entitled to a lien thereon under his agreement with the seller for the amount so advanced, the transfer of the automobile not having been accompanied by an immediate delivery and followed by an actual and continued change of possession, as required by Civ. Code, article 3440.—*Davenport v. Alexander*. District Court of Appeal, Cal. 200 Pacific 771.

Current Comments and Observations

By The Editor

Automobile Changes Trade.

A rather new sidelight on the change which the automobile has brought about in the trade map of the United States is noticed in the little commercial villages which, in the days before the automobile and good roads, were scattered all over the country.

In those days, there were stores of various kinds in the little villages, but the automobile has revolutionized the trade, for the little commercial village has passed. The general store, however, remains.

In the early days before the time of the motor car, the people living in the territory of the little villages necessarily bought most of their supplies in these villages, for it was too long a journey to the large towns or county seats. The merchants in these villages ordinarily carried in stock the goods upon which there was the greatest profit and the people bought not what they wanted but what the dealers chose to sell them.

The advent of the automobile has changed this condition. While the general store remains in the village, it must carry what the people want, otherwise the people will travel to the larger places in their cars and get what they want.

There is a lesson in this change in the commercial life in the smaller places. It is that service is essential to success and its spirit must be adapted to meet whatever the changing conditions of the times require.

* * * *

Definitely on the Mend.

"Further progress in the recovery of business in the United States is reported from week to week. While the greatest activity is in basic industries, the improvement is evidenced in distribution, also, and the increasing confidence which is shown by the volume of forward purchasing is substantial evidence that business is very definitely on the mend.

"In the iron and steel and automobile industries, this betterment is especially pronounced. Textiles also have shared in the advance; intense activity in building is sustained; and the movement of freight other than coal shows further increase in volume."

These quotations are typical of the

opinions expressed regarding business conditions. The automobile industry is mentioned as making a surprising recovery from the depression.

The sales of well-established motor-car companies are, in comparison, much more

Acquaint Employee with His Part in Accomplishing Your Purpose.

A new worker, whether that worker is a stenographer or a machine operator or a salesman, cannot be expected to fit into an organization unless he is told what that organization is trying to accomplish and what is his own part in that accomplishment.—H. L. Hohlfeld, president, Hohlfeld Mfg. Co.

than many other important lines of business. Production of many plants is greatly exceeding previous records.

There is a general unanimity of opinion that business generally has improved and will continue to do so.

* * * *

Yellow Tail-Light, a Safety Move.

Automobile engineers are considering the advisability of using yellow in place of red tail-lights so as to minimize the danger of motorists confusing lights placed along highways to indicate dangerous road conditions with automobile tail-lights.

Many accidents occur owing to motorists being confused in this way, particularly in the larger cities. A case recently occurred in Chicago in which a driver not familiar with the road was following another automobile late at night. The first automobile crossed a drawbridge over a river which swung open immediately after it passed.

The red warning light on the light lazy-tong gate that swung across the road as the drawbridge opened, closely approximated the position of the tail-light of the first automobile—and the driver of the second automobile thought that the red light in front was the tail-light of the automobile he was following. The result was that the short section of bridge between the gate and the open draw was all that prevented a serious accident.

As an automobile following another can

generally turn out and pass it, it will be appreciated that the rear end of an automobile—unlike the railroad train which cannot turn out to pass the train ahead—is dangerous only when it is slowing down or standing at the roadside. The use of red lights in automatic or manually-operated stop signals for the rear of automobiles is, therefore, logical.

The use of yellow as an automobile tail-light has an exact parallel in railway operation, inasmuch as yellow is used by the railroad as a caution light. This is really what the tail-light of an automobile is intended to be—to caution the following machine that care must be exercised in overtaking and passing other automobiles.

Engineers, executives of automobile and other automotive manufacturers, have studied this proposed change and generally approve of it. The fact, however, that the use of red tail-lights is required by law in many states will mean that the change to yellow tail-lights cannot be made until the laws in these states are revised.

The use of existing tail-lamps will in no case be affected, as it will be possible to obtain yellow lamp glasses to replace the red lamp glasses now in service, if such replacement is wished by the individual owners.

* * * *

Five Times—Then to Court.

In New York City a new plan is to be tried out in handling violations of minor traffic rules.

Each automobile driver will receive a card from the police department on which is provided space for a traffic officer to note six violations of minor traffic rules.

When the sixth space is filled, the offender receives a summons and for the first time he is haled to court. To insure absolute identification, each applicant for a traffic warning card is required to file two recent photographs of himself.

Notations on the warning cards are limited to such violations of the traffic laws as usually merit reprimands or small fines. Speeding and other serious offenses are to be met by the issuance of a summons or will be followed by arrest as heretofore.

The Generator and Starting System

While the Armature Is a Vital Part of the Generator, the Only Part Requiring Especial Attention Is the Commutator—Methods For Fitting and For Cleaning Brushes—Operation and Care of the Starter Described

By J. R. Bayston, M. S. A. E.,

Automotive Director, Coyne Trade & Engineering Schools

The armature is a very vital part of the generator. The only part of the armature that requires special attention is a commutator. This is the part on which the brushes bear. It should be kept clean and smooth, also free from oil and dirt.

If care is taken when oiling the bear-

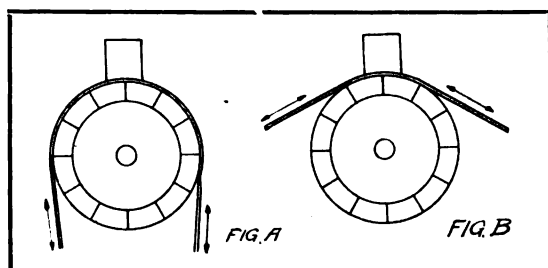


Fig. 1.—Proper and Improper Method for Fitting Brushes to the Commutator of Generator.

ings of the generator, there will be very little trouble caused by grease on the commutator. A few drops of oil only should be used in these bearings. If the oil has a tendency to work in the generator from the crankcase or from an adjoining gear case, it is sometimes necessary to pack the bearing with a felt washer to prevent the oil from passing.

In order to clean a greasy commutator, it is best to hold a dry rag against it. This takes off the worst of the dirt. A rag washed with kerosene should then be held against the commutator with the generator running. Too much kerosene should not be used as it will be thrown around the generator. The engine should be allowed to run a few minutes after this operation so that the surplus gasoline may be dried up.

The mica space between the commutator segments should always be kept free from grease, oil or bits of carbon and copper. If such materials are allowed to collect on them, they are liable to cause a short-circuit in the segments. The space may be easily cleaned with the sharp point of a tool or mica undercutting machine. A piece of hard wood is excellent for this purpose as it will not make a burr on the edge of the commutator bar.

If the surface of the commutator is rough, it may be smoothed down by holding a piece of fine sandpaper against it. Emery cloth should never be used, for the material on the emery cloth, if lodged between the commutator segments, is very apt to cause a short-circuit as it is a conductor of electricity. If there are grooves around the commutator, the armature should be

placed in a lathe and the commutator turned down with a very sharp cutting tool. The armature should be revolved at a high rate of speed until the commutator is the same diameter at all points and there are no low spots in it.

After turning the commutator down, the mica should be undercut between the segments. If this is not done, it will cause the brushes on the majority of generators to ride the mica, thereby causing a poor contact between the brushes and the segments. A poor contact will cause the brushes to spark and this sparking blackens the commutator. Continued operation in this condition will cause the generator to stop charging. When brushes are fitted to the commutator, it is very necessary that the work be properly done. An improperly fitted brush will give poor service and, in case of a third brush, the charging rate will be altered considerably when the brush wears in.

Fig. 1-A shows an excellent method of fitting brushes. The sandpaper is placed between the commutator and brush with the rough side towards the brush. By pulling backward and forward, the brush will come to a perfect seat. Just a few pulls are generally sufficient as the sandpaper cuts quite rapidly on the ordinary graphite brush.

In Fig. 1-B is shown the improper way to fit brushes. When the sandpaper is pulled in this case, it makes the bottom of the brush flatter with the result that it does not bear evenly on the commutator.

Another excellent method, Fig. 2-A, is to wrap a piece of sandpaper around the commutator, lapping it very carefully at one end about $\frac{1}{4}$ to $\frac{1}{2}$ inch, leaving the sanded side up. It is only necessary to turn the commutator with the hand in order to fit all brushes. The sandpaper can be held to the commutator by means of glue, or if the commutator is sufficiently wide, a string can be placed on each side. If the paper is sufficiently thick to allow the ends of the sandpaper to butt up against each other, as shown in Fig. 2-B, it will be much better as a lap sometimes wears down the edge of the brush with the first scratch.

Remember that the armature should be turned in the same direction that it oper-

ates as this will always give the best fitting.

Every generating system must have some means of protecting the battery from discharge when the generator is not producing current. Electricity will always follow the line of least resistance and if the generator were not producing a voltage, the voltage of the battery would cause current to flow through the generator, if some protecting device were not used.

The automatic cut-out—sometimes spoken of as the relay—is used for this purpose. It so functions that, when the voltage of the generator reaches a point higher than that of the battery, the generator circuit is connected to the battery so that the battery may be charged by the generator. It also disconnects the battery from the generator when the voltage of the generator becomes less than that of the battery.

Some may have the idea that the automatic cut-out is used to disconnect the battery from the generator when it becomes fully charged. This, however, is not the purpose of the cut-out. It will never do this, and if one depends upon it to do such a thing, you are very apt to overcharge your battery.

The principle of the typical cut-out is shown in Fig. 3. Every cut-out must have at least two windings: One is the primary or heavy winding; the other the voltage or secondary winding. The voltage winding is used to close the cut-out contact points when the voltage of the generator is greater than that of the battery. When the armature of the generator starts to rotate, it produces electricity in the method described in the article in the May issue. This current flows through the voltage winding of the cut-out, returning to the other terminal of the generator.

When current flows around this coil, it

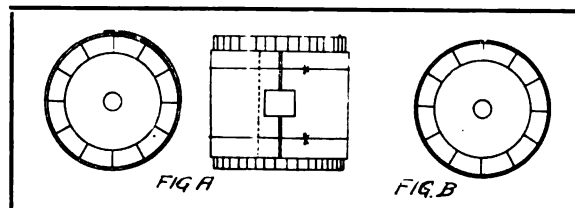


Fig. 2.—Another Method for Fitting Brushes, Sandpaper Wrapped Around Commutator.

makes an electromagnet of the core which has a tendency to attract the armature A, Fig. 4, and when the attraction is sufficiently great to overcome the tension of the spring B, Fig. 4, the contact points, C, will close.

It will be noticed that the battery is then

thrown in series with the generator and the current must flow from the generator through the armature, *A*, through the contact points, *C*, through the heavy winding of the cut-out and through the battery, before it can return to the generator.

True, there is a small amount of current flowing through the voltage winding; however, as the resistance of the voltage winding is so great compared to that of the primary winding and the battery, it prevents a great amount of current from flowing through it.

Do not confuse the automatic cut-out or relay with the circuit breaker. A cut-out is always connected in the generator battery circuit, but a circuit breaker is always connected in some lighting or ignition circuit. The circuit breaker is a protective device similar to a fuse. It opens when an excessive amount of current flows, such as follows a short-circuit.

The starting motor of an automobile is

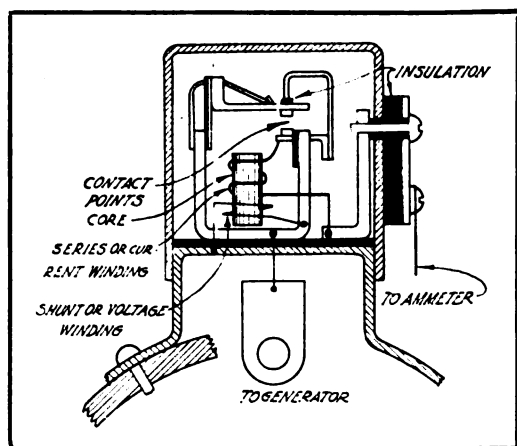


Fig. 3 Shows the Principle of a Typical Cut-Out.

used for one purpose only—to crank the engine. Although it is sometimes used as a generator, it does not give as much trouble as the generator. Practically all starters operate on 6 volts, there being, however, two or three systems that use a 12-volt starter and battery.

In the previous article, the method of generating current by means of a magnetic field and a conductor cutting this magnetic field, was taken up in detail. The operation of the starter is simple, the reverse of that of the generator, keeping in mind the fact that when an electric current is passed through a wire, a magnetic field is set up around this wire.

Let us look at Fig. 5, which represents a loop of wire or one coil of a starter armature between two field poles. The field cores are electromagnets, the current from the battery passing around the field coils producing a strong magnetic field between them.

This magnetic field flows from the north pole to the south pole. The current also flows through the coil of wire. If for instance, it goes in the coil of wire at *A*, the magnetic field set up around the coil of wire will be in a clockwise direction. The

magnetic field always flows around the conductor in the same way that a right-hand screw thread passes around the pole. As the current is coming out of the loop *B*, the magnetic field set up around this wire will be in an anti-clockwise direction.

The magnetic lines of force of the field uphold the magnetic lines of force of the coils with a result that the armature on which the coil is mounted turns in an anti-clockwise direction. You remember, from a previous article, that the like poles of two magnets repel each other. We simply have the repelling force of these fields which gives us the rotation of the armature.

As the starter must have great turning torque, it is necessary to pass a large amount of current around the fields and through the armature in order to produce a magnetic field sufficiently strong to crank the engine. The stronger the magnetic field, the greater will be the turning torque.

If the cables leading to the starter from the battery are too small, it will cause a restriction to the flow of current to the starter and the result will be an inefficient starter. If, on the other hand, the brushes are not properly seating or the spring tension on the brushes is weak, there will be another high resistance set up in the starting circuit and the starter will not have sufficient power.

The commutator on the starter should be taken care of the same as on the generator, although it is sometimes difficult to undercut the mica, as the starter is only used a few seconds at a time and the commutator seldom reaches a very high temperature.

The terminals of the battery must be kept very clean and tight so that there will not be a high resistance at this point. The connection to the ground in the case of a one-wire system is also very important, as a corroded ground connection will cause a high resistance.

Taking the Chatter Out of the Ford Transmission.

The Ford transmission is the most compact and efficient of its kind now in use. It is flywheel, magneto, splash oiler, service brake and transmission rolled into one.

Complicated as it would at first seem, it is in reality very simple. The various speeds are obtained by braking the motion of one or the other of the three drums which constitute a part of the mechanism. For this purpose three steel bands are used, each band provided with a woven cotton lining. This lining undoubtedly causes more "grief" than anything else in the transmission.

Directly and indirectly it can and does cause burnt-out connecting-rod bearings, scored cylinders and short-circuited or grounded magnetos. So it pays to watch and replace the linings when they become burned or worn out. The lint that they give

off in this condition often gets into the funnel-shaped opening of the oil pipe and hampers the flow of oil, thereby resulting in burnt-out bearings. Or the cotton may accumulate around the magneto coil or on the post and prevent its generating.

However, more frequently than other-

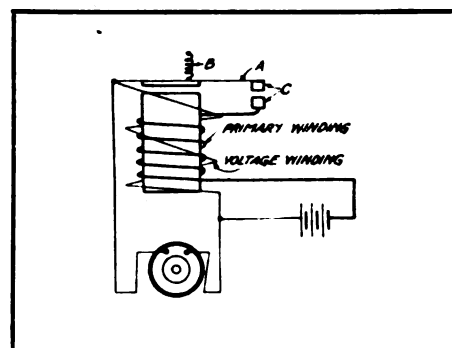


Fig. 4.—Current Flowing Around Coil Makes Electromagnet of Core.

wise, the linings do not wear out but become so hard that they almost cease to function. The service or foot brake may be applied with all the force possible, but it will not arrest the motion of the car until it has glided for some distance. Then it will stop with a suddenness that almost pitches one through the wind-shield.

If the low-speed pedal or reverse is applied the machine will shake and chatter. Needless to say, this is hard on the motor, transmission and differential, and the condition should be remedied immediately or harm will result.

It is not a difficult job to replace these linings, but it requires considerable knowledge to do the work right—and if it is not done properly, the results are not worth obtaining.

Many jobs are turned out of the shop and, in less than a month, are back again with the same old chatter, ready for new linings. This condition is usually the fault of the owner. He may let the oil in the motor become low, or may not drain it and replace it with fresh oil often enough.

To replace Ford transmission linings the transmission cover must be removed. To do this, unscrew the exhaust pack nut and

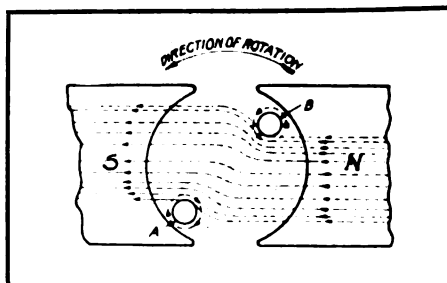


Fig. 5.—One Coil of Starter Armature Between Two Field Poles.

disconnect the muffler pipe. Remove the two bolts on the top of the universal joint housing and the 12 bolts and capscrews around the edge of the cover.

(Concluded on page 38)

Capital Versus Good Judgment

One Man Had the Capital and Could "Tell the World" How Business Should Be Done—The Other Had Little Money and Less to Say but He Believed in "Keeping Faith" with All—When the "Show Down" Came Which Was Loser ?

By J. N. Bagley

Dan Wilson and Jim Dodge were both men of mechanical ability—both working in a garage in the county seat. Dan was the sort of a fellow who knew all there was to know and didn't hesitate to tell "the boss" how he should do things to make a success of his business.

Jim Dodge was a good mechanic and knew quite a little about the business in a general way, but he had very little to say, except as he was asked. Jim was not a talker but a listener as well as a great observer. He was an orphan lad who had been obliged to make his way by hard knocks.

Shortly after Jim was married, death claimed the owner of the garage. The widow sold the garage equipment and tools at auction and leased the building to a couple of brothers who converted it into a suitable building for a stock of general merchandise, leaving Jim again without employment. He had no money to speak of and, there being no positions open, he naturally felt a little downhearted and blue.

Jim's father-in-law was a man of moderate means but he had sufficient faith in Jim to risk a chance on him and loaned him \$500 with which to open a little shop down on a side street. When Mr. Doan made Jim the offer, Jim's large blue eyes were filled with tears. Never before in his life had any living person taken so much interest in him and it seemed to Jim like a fairy dream. As Jim grasped Mr. Doan's hand with both his, he was heard to remark: "Mr. Doan, you have faith in me and I'll never betray that faith." And Jim never did.

In the course of three or four weeks, Jim opened up the little shop down on the back street and began doing business for himself. Situated as he was in rather an out-of-the-way place, business came a little slow for the first few days, but as time went on new customers began to drop in and things looked brighter for Jim.

As soon as the customers of the old garage knew where the little shop was, they began to come regularly. When they wanted something that Jim did not have, they would get on without it until he could order it for them. One of his well-to-do customers who lived in the country, knowing that Jim's capital was limited, offered to loan him as much money as he wanted to get onto his feet and get started, but he declined, saying he would rather get along in a small way and have less to think about.

Salesmen began to call on Jim to sell

stocks of accessories but he purchased nothing for three or four weeks. All the while, however, he was making plans for what he would do later. He subscribed for a number of the leading trade journals and perused them carefully to get a line on the advertised goods, making notes as he went through them. Then he began to buy from

BE A DOER.

Virtue by itself is not enough, or anything like enough. Strength must be added to it and determination to use that strength. The good man who is ineffective is not able to make his goodness of much account to the people as a whole. No matter how much a man hears the word, small credit is attached to him if he fails to be a doer also; and in serving the Lord he must remember that he needs to avoid sloth in his business as well as cultivate fervency of spirit.—Theodore Roosevelt.

the salesman who came down to see him, buying only such goods as were advertised in the journals.

The writer happened to be in Jim's place of business when a "Gyp" salesman called to sell him a line of spark-plugs. He looked them over very carefully and the salesman proceeded to tell him that no better plugs were on the market and that he could give him an extra 20 per cent discount if he would take 250 of them, assorted as he wished them. He would also throw in, free of charge, a nice metal cabinet in which to display the plugs.

Jim took out his little memorandum book, looked through it and then he told the salesman he could not use his plugs. At this the salesman acted surprised and wanted to know the reason.

"The reason is," said Jim, "I do not find your plugs advertised in any of the trade journals—and I sell nothing but the advertised goods. If your plugs are, as you claim, the 'best in the world,' why doesn't your factory advertise them in the trade journals?"

The "Gyp" salesman argued that they did not spend money for white space in trade journals at high rates. Instead they gave the difference to the dealers who handled their goods, in the way of extra discounts, etc. On the face of it, it looked very well but Jim had made a resolution in the beginning to buy only advertised merchandise, and he was going to stick to the end, so he did not

stock the spark-plugs. However, the "Gyp" salesman succeeded in placing the order with Jim's competitor—and he had the plugs many months after, unsold.

In the course of two or three weeks Jim had a nice little stock of clean, salable merchandise, all of which he purchased from responsible jobbing houses in his territory. Every article on his shelves he could recommend to his customers, for he knew the jobber would make any item good that failed in the purpose for which it was intended.

Before the summer was gone, business was humming with Jim. He had paid back the \$500, or thought he had, as he had given it to Mr. Doan. Later he found that his father-in-law had taken it over to the bank and deposited it to Jim's credit, destroying the note which he held. Of course, this gave Jim new life again and he began to realize the world was for him if he tried.

By this time, Dan Wilson envied Jim's little business and the success he was making of it, so he began making plans to get into business in a "big way," as he termed it. Dan's father was quite wealthy and Dan persuaded him to purchase a large brick building and furnish the money to stock it with an up-to-date garage equipment and stock. When the building was purchased, Dan was given a deed to it and \$5,000 in good, hard cash with which to carry on his business.

Dan's one great ambition was to show Jim how to run a garage; he also wanted to corner the business and put Jim out with his "dinky little shop." He ordered pirate parts galore and unadvertised goods, taking advantage of the large discounts, etc., expecting, of course, that folks would fall over themselves to buy them—but they didn't fall like Dan thought they would.

It is useless to say that Jim was not more or less worried about his new competitor, for he was. He knew that Dan's father was wealthy, and money went a long way in the business game. But he never gave up a single minute; just kept hammering away as if he never had a competitor, sticking close to the methods he had formulated in the beginning. He purchased all his goods from regular salesmen, while Dan refused to buy anything from them, thinking, of course, they would quit making the town if he refused to buy.

Dan cut the price of labor hoping to get Jim's business away from him. For a little time it seemed that he would get

quite a little of it, but the work he turned out was not up to standard and people began to go back to Jim, for every job he turned out was first class, so in the long run the little difference in price had no effect on Jim.

Matters ran along in this way for about a year. Then one day Dan failed to open his place as his creditors held the key to it. The building his father had given him as clear as the sky was mortgaged and Dan was down and out. His father refused to do any more for him, so the mortgage was foreclosed and the building sold. Jim purchased the building, paying nearly all the money in cash, and a month later moved into it from the little back street.

Dan Wilson is still working as a common mechanic, while Jim is the sole owner of the big garage and employs a number of men in the shop. The way he handles his business and his men may interest other men in the business who are in for the money, so we will outline a few little kinks that have made him a favorite with his men and with his customers.

Every man in Jim's employ receives a commission on cash sales and a bonus on all jobs that go out where the customer does not register a complaint about the work done. The commissions are checked up and paid every Saturday night, while the bonus is paid three months after the job has left the shop.

That is, if John Johnson brought his car in for an overhaul and John Doe was the workman, a ticket was made out showing just what was done and the time it was done. If, after the job went out, no complaint was made within a reasonable length of time, John Doe at the end of three months received 5 per cent of the overhaul price, not including any new parts that were used. Therefore it behooved every man in Jim's employ to give the customer the very best he could give him and not to let the car out of the shop until it was absolutely right in every respect.

All sales made by the workmen were credited to them and they received every Saturday night 2 per cent of their sales for the week. Jim says that, when he first formulated the plan and began paying the commissions to the men, it looked like he was paying out all his profits in commissions but, when he began to make comparisons as to volume of sales with the old method, he was surprised to find that he was making nearly double the money he made under the old plan.

Every man in the place works for Jim because he can make more money there than any place else in the country; therefore, he never has trouble in getting help, for his help never leaves him. Since this plan was put into effect, Jim says he has never had a dissatisfied man working for him and has never had a man ask him for a raise in salary.

Each man in the place has one holiday each month on full pay—just what day is ar-

ranged to best suit all concerned. In addition to this, once each year each of the men is given a two week's vacation on full time, one of them going at a time. Should business be a little heavy, Jim gets into the collar himself while the men are away or gets outside help until the regular man can return.

The first and foremost thing that is considered at Jim's place is "service." The average motorist knows very little about the car he drives; therefore Jim makes it his business to explain in detail the operation and minor adjustments of the car to his customers. He goes out of his way many times to help the customer to understand and know his car from motor to rear axle.

To do this, he takes from the stockroom such parts as will enable him to give an educational talk on the particular unit, and he never stops until the customer thoroughly understands the why and the wherefore of the unit in question. This gives the customer a working idea of the unit, and when a man understands a piece of machinery he is able to get the most out of it.

One might think from first thought that this would be the wrong thing to do as the customer would take advantage of the information gained and get to doing his own repairing, but such is not the case. It does do this, however, in every single instance: It gives the customer a working idea of things that tends to convince him that the charges for the repairwork are legitimate.

Since Jim has practiced the educational plan with his customers, he has never had any trouble over repair bills, for the customer understands thoroughly what was done and why and about how much time was required to do it.

When a repair job is taken in, the time that it is to be delivered to the customer is placed on the ticket after the mechanic who is to do the work has been consulted and has made his report. The customer gets the time of delivery on his ticket as well. When he calls at the stated time, he always gets the job just as promised—and he pays the price specified at the time the work was left, for all jobs are done on the "flat" rate plan. The customer is never told he will get a car at a certain time, only to get it the next day about 3 o'clock.

All repair jobs are tested out by the man doing the work, who places his report on the repair tag, after which it is turned over to Jim who gives it the final test and stamps it with his O. K. When he places his name on the tag it is 100 to 1 the job gives perfect satisfaction.

A few days ago a tourist stopped at Jim's place for repairs. His car was carefully looked over. They did not have the necessary parts in stock, so they telephoned the local dealer who advised them that he had what was needed and would send a lad down with it.

The tourist was given a ticket showing the charge and the time of delivery, and he went out leaving the car in their care.

This car was taken down and made ready for the part when the dealer telephoned them that he had made a mistake in the number and was unable to furnish the necessary part short of two days. The car was to be delivered to the tourist promptly at 9 o'clock the following morning and it was then 5 in the evening.

As usual, Jim made his promise good, regardless of cost. He employed a lad with a motorcycle to go to the nearest place the part could be obtained, which was a distance of a little over 100 miles. The trip was made during the night and, when the tourist came for his car the following morning, he found it ready just as promised and he paid Jim the price called for on the ticket given him. When the customer learned the expense Jim had been put to, he offered to stand it but his offer was not accepted.

As it happened the tourist on his way back traded for a general store and located within 18 miles of Jim. Every repair job of any consequence he sends to Jim and he has been responsible for 25 or 30 new customers coming down to Donohou's garage regularly for repairs.

Jim says, "You cast your bread upon the waters." He has been repaid many times the expense of sending the motorcycle rider on a night run for the parts to make his word good with the tourist whom he never expected to see or hear of again.

Many women drive cars these days and this fact presented another angle of service to which Jim caters. His little waiting room with a feminine touch is inviting. Two or three times a week he has a woman look after it, giving it the appearance that would appeal to women.

The entire organization, from front to back, recognizes the importance of courtesy, and a willingness to serve in any capacity whenever the garage is visited by ladies.

Every car driven in by a woman is attended by a workman with a clean ulster, especially when the car is not taken to the workshop. Great care is taken to see that no dirt or grease is smeared on the car.

Every man in the employ of the place has but one aim in view—that is to make himself recognized and win the respect of the car owners. As a result every man or woman who comes into the place becomes a permanent customer.

Upon such foundation a lasting and successful business has been built by a man who started with nothing but grim determination to succeed and stuck to it until the clouds broke and the sun came through.

United States Makes Reimports of American Cars.

During the past three years 625 American cars and trucks valued at \$1,159,031 were reimported from France and 1,801 valued at \$2,819,633 were reimported from Great Britain. No information is available as to the proportion of military supplies sent to Europe by this country.

Finding Profits in Your Storeroom

In this Concluding Installment of the Discussion of Storeroom Methods a Number of Convenient Record Forms Are Described—How Suitable Record Forms May Eliminate Errors and Facilitate the Handling of Stock Items

By Gustav H. Radebaugh

The convenience of knowing how much stock is on hand is not only valuable when ordering, but it is also the best guarantee that your customers will be supplied with repair part replacements without unnecessary delays.

In using a perpetual inventory plan, there are three essentials that are absolutely necessary for success:

1. A physical inventory to determine the number of pieces at the start.
2. A record of material or supplies received.
3. A record of material or supplies delivered.

In this plan it is also advisable to establish maximum and minimum allowances of stock. This eliminates the unnecessary tie-up of capital in stock that will be used only over a long period. In other words, if the stock maximum allowances are held down as low as would be consistent with good business judgment, the turnover of the stock investment will be more rapid and, therefore, a greater profit will be made.

To make it easy for a dealer to take advantage of some of these standard practices of stock control, some supply houses have added to their line a complete set of forms that can be purchased in thousand lots. The form in Fig. 11 is of standard design. Notice that it is arranged to receive entries of stock ordered, received and delivered. To further explain just how this form is used the following jobber's description will be of interest:

The perpetual inventory record card is a

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| Form 61—STOCK ROOM RECORD CARD | | | | | | | | | | | | | | | MINIMUM 4 | | PARTS NO. 101433 | | COST \$2.32 1/2 | | SEC. D | | BIN NO. 105 | | | | | | | |
| DESCRIPTION OF PART <i>Bevel Gear—48T</i> | | | | | | | | | | | | | | | MAXIMUM 10 | | | | SELL \$14.50 | | | | | | | | | | | |
| FOR <i>10-20</i> <i>Shastor</i> ——— CAR MODEL ——— NUMBER USED IN COMPLETE CAR <i>1</i> ——— | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ON ORDER | | | | | RECEIVED | | | | | DELIVERED | | | | | DELIVERED | | | | | | | | | | | | | | | |
| Date | Order No. | Routing | Qty. | | Date | Invoice No. | Qty. | Total Received | | Date | Reg. No. | Qty. | Total Del'd | Balance O.H. | Date | Reg. No. | Qty. | Total Del'd | Balance O.H. | | | | | | | | | | | |
| <i>6/14</i> | <i>146</i> | <i>F.A.T.</i> | <i>10</i> | | <i>6/22</i> | <i>5536</i> | <i>10</i> | <i>10</i> | | <i>6/28</i> | <i>143</i> | <i>1</i> | <i>1</i> | <i>9</i> | | | | | | | | | | | | | | | | |
| <i>7/1</i> | <i>289</i> | <i>F.A.T.</i> | <i>10</i> | | <i>7/17</i> | <i>8446</i> | <i>10</i> | <i>10</i> | | <i>8/16</i> | <i>437</i> | <i>1</i> | <i>1</i> | <i>2</i> | | | | | | | | | | | | | | | | |
| | | | | | | | | | | <i>7/1</i> | <i>488</i> | <i>1</i> | <i>1</i> | <i>11</i> | | | | | | | | | | | | | | | | |

Fig. 11. Standard Form Inventory Card for Perpetual Stock Record.

buff cardboard, standard size, printed on two sides. It gives a complete record of each stock item, showing the date and the quantity purchased, with order number and routing, date and quantity received, with invoice number and total received, date and quantity withdrawn and the requisition number; also the balance on hand.

It has a record for 40 receipts and 80 withdrawals, and balances every line. It makes a perpetual inventory for your stockroom. The sample form shows that on June 14, 1921, 10 bevel gears, No. 48T, were ordered. On June 22 they were received, having come in by freight as ordered on order No. 146. The company's invoice number was 5536.

On June 28, requisition No. 143 for one bevel gear was presented at the stockroom and it was delivered, leaving nine on hand. On July 1, another requisition, No. 171, for one bevel gear, was presented and that left eight and another on July 12, leaving on hand seven. On August 14, there were three on hand, so an order, No. 207, was placed for ten more, to come by freight.

Before these came in, the stock ran down

to one on the 17th, and an order, No. 219, was placed for two, to come by express. These were received on the 19th. So when one was withdrawn on the 26th, it left two on hand. On August 29th, the freight shipment of ten came in and, on September 1, when one was withdrawn, 11 were left on hand. Thus, at any time, a record of the stock and pur-

chases is always readily available.

This form should be kept in the main office where the necessary entries can be made, and it should be conveniently filed as shown in Fig. 12. Each card should be indexed under repair parts accounts with the division as given in the graphical control chart shown in the section of this article published in our May issue.

It is observed that considerable time can be saved by the clerk if the cards are easily found in the file. Entries on this record should be made each day. Physical inventory is necessary only at the beginning of a record and at intervals found necessary upon an inspection of records.

Identifying Shop Tools and Equipment.

To effectively control all the tools and equipment, a record is made of each article amounting to a value of more than one dollar, or whatever valuation is established. This record is made when the article is received and an identification number is placed on the article. These record cards are filed as shown in Fig. 13.

The information found on the record card is the inventory number, name of

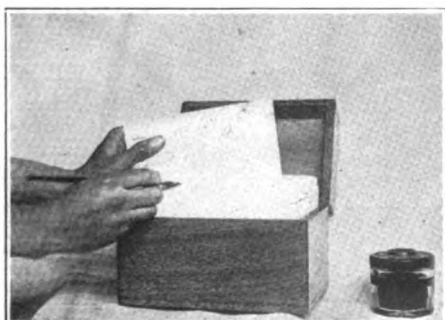


Fig. 12. Filing the Inventory Cards.



Fig. 13. Identifying Equipment with Record.

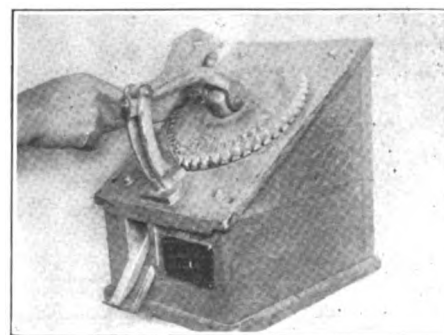


Fig. 14. Making Labels for Inventory Tags.

article, from whom purchased, cost and date purchased. Some recommend the depreciation rate and yearly valuation entries.

The most simple inventory numbering

place by driving the escutcheon pins in the holes and bending them over on the inside. Machine screws are sometimes used but this method requires considerably more time and

some material is returned by the customer or the shop, the credit memorandum is used. This form is shown in Fig. 17.

The keynote of the storeroom should be

Fig. 16. Form for Stock and Supplies Issued.

scheme is to have the firm's initials prefixed, the inventory number being indicated thus: F.W.7. 32, the figure "7" designating the seventh division of equipment inventoried. For example, the office furniture could be represented by the figure "7" and the "32" representing the 32d article in the office inventoried, the shop tools being represented by division number "6."

To make a plain substantial inventory number to be placed on large equipment—such as desks, chairs, cases in storeroom, machine tools, etc.—an aluminum tag can be stamped on the embossing machine as shown in Fig. 14. This is not a costly machine, but the installation would not be justified unless a firm had considerable tagging to do. This method of aluminum tagging is frequently used, not only for inventory but for tagging storage parts and parts returned to the factory for repair. Oil does not affect this tag as it does the paper tag so commonly used.

The method of placing the tag on metal equipment may be of interest. I have found that the most simple way is to drill holes a trifle smaller than the escutcheon pins, shown in Fig. 15, and put the label in

Fig. 17. Credit Form for Returned Stores.

does not make any better appearing job.

Stores and Stock Forms.

To properly control stores, it is necessary to use several forms. The location of the storeroom and the business volume has some influence on the types and number of



Fig. 15. Fastening Tag on Equipment.

forms that should be used. The forms shown are suggested, to give some idea as to the general arrangement and character.

Some may decide that it is not necessary to incorporate all the items of entries found on each form. Adjustments can be made to suit individual cases as long as the same general principle is used. Four forms are generally needed in the storeroom for the effective control of stores. Every item that is issued from the storeroom is charged on a store's requisition such as is illustrated in Fig. 16.

Nothing is issued unless the proper charge is made. This is the connecting link between the office and the storeroom. The original of this charge is sent to the office, invoices are issued to customers from these charges and entries made on the perpetual inventory card already described. In case

Fig. 18. Stock Clerk's Order for Supplies.

one of service to the shop men. Nothing is more trying to a mechanic than to be delayed in securing stock, as well as making out charge records. If a workman needs repair parts from the storeroom, he calls for the part desired, signs his initial on the store's requisition and enters the job number. This is the only entry it is necessary for him to make.

The storeroom clerk makes all the other entries necessary on the form, so that an intelligent charge can be made. To eliminate all verbal connection between the storeroom and the office, the form shown in Fig. 18 is used. The storeroom clerk can see, by referring to his carbon copy, just what items he has ordered and when they were ordered. This entirely does away with discussions as to how many items were ordered from the storeroom and when they were ordered. This form is not absolutely necessary in the cycle of control, but it will be found very useful. When a customer or the shop orders through the storeroom, the order can be made out on this form and a closer follow-up is made possible.

When purchases are made, a much more effective follow-up can be maintained if some standard form is used for the purchase order. One style of purchase order is shown in Fig. 19. It is made up in duplicate or triplicate.

If triplicate copies are used, the original goes to the vender, the duplicate being filed in the office and having pinned to it the form shown in Fig. 18, which was received

(Concluded on page 46)

Fig. 19. Order for Stock and Supplies.



Fig. 20. Desk for Storeroom Clerk.

Some Business-Stimulating Ideas

Massachusetts Merchant Rents Wrench Set to Motorist and Finds It Is a Good Advertisement—Novel Copy Ideas Which Some Accessory Dealers Have Found Good Advertising—Collection Letters That Collect the Cash

Rents a Wrench Set.

L. E. Stickney, the hardware merchant of Somerville, Mass., has an advertising display in the show window of his store on lower Broadway that attracts the attention of all the motorists in that vicinity. It is a set of wrenches in a neat box, with a sign, which says:

**This Wrench Set May Be Hired
By the Day—50 Cents.
\$10 Deposit Required.**

The set consists of 26 nut seats in assorted sizes, square and hexagonal, an extension seat, a universal joint which is made for a nut seat, a Mossberg No. 350 ratchet wrench handle, and the familiar bent screwdriver.

He finds that this is a good advertisement, and brings many automobile owners into the store, even though they do not hire the set. The set has found two classes of customers, the men who hire it for a day and go over their cars, tightening every nut and making sure that nothing is loose, and the men who hire it for a holiday or a Sunday trip. The real reason for hiring, instead of owning, appears to be that they think that the wrenches would disappear if kept around constantly.

This may suggest a possible opportunity for garage proprietors.

Novelties in Advertisements.

In the matter of newspaper advertising by automobile accessory dealers, there is a surprising lack of originality in most of the copy written. Most of the dealers are contented to list a few "leaders," stressing either price or quality—or both in some instances—and let it go at that.

Too little attention is given to the matter of preparing "copy" for the papers. The result is that there is a remarkable "sameness" to most of the "copy" printed. In fact, practically all of the advertisements offering automobile accessories for sale look almost exactly alike. They lack distinction to a surprising degree.

There are a number of ways by which a dealer may make his advertisements stand out from the others. It may be done, for instance, by a clever play on words forming a slogan—"See Joe—Save Doe"—which always appears at the head of the advertisement. Or by a picture of the dealer at the head of the advertisement, followed by something like: "Come to Dave's Place at the Hole-In-The-Wall if You Want to Save Money on Your Auto Accessories."

"Joe" and "Dave" are located in a city of over 1,000,000 inhabitants, yet it is quite safe to say that nearly every automobile

owner in the metropolis can tell you where "Joe" and "Dave" have their places of business. One of the shops is so small that the term by which the proprietor describes it—"The-Hole-In-The-Wall"—is quite apt.

There is another method by which one dealer calls attention to his service, his accessories, etc., which is perhaps the most novel of all methods. This dealer is located in Grand Rapids, Mich., a city of something like 150,000 inhabitants and, of all the accessory advertisements published, "Ed's" advertisements stand out like the proverbial "sore thumb." Probably his advertisements are more widely read than any other dealer's in the city for he invariably writes them in rhyme.

Here is a typical advertisement that appeared recently:

We have told you of our MOTOR OIL
And about our GASOLENE;
We have told you of our STATION
Which most of you have seen.

While there are LOTS of STATIONS
More PLEASING to the eye—
They may be made of wood or brick,
Which anyone can buy.

But the SERVICE that they give you,
In this or any zone—
It may be all you ask for,
Yet NO BETTER than our own.

For we not only sell you GAS,
But other parts as well,
For lots of things may happen;
When and where, no one can tell.

You may run out of GASOLENE
And not know what to do.
Just remember WE HAVE A TELEPHONE,
And we'll bring it out to you.

There are lots of other troubles
Which might make your temper boil—
Such as burnt-out Cranks and Bearings
Caused by lack of MOTOR OIL.

And if you need a SPARK PLUG,
A TIMER, OR A CONE,
And have no way to get it,
Just CALL US ON THE PHONE.

We have not got a big swell car
To bring it out to you,
But never mind, WE WILL GET THERE
In our LIZZIE PAINTED BLUE.

ED'S
GASOLENE FILLING STATION,
315 Hall St.
E. R. Terwilliger, Prop. Phone S1552-J.

Probably "Ed." does not dash off copy as rapidly as some of his competitors do but undoubtedly the efforts which he puts forth in composing his jingles attract more

than enough extra business to amply repay him.

Nearly everyone can write similar jingles if they will make a little extra effort to do so—witness the thousands of contestants in the recent newspaper jingle contests which have been held in various cities of the country. This same way of attracting attention to advertisements is open to every dealer if he will make the extra effort of turning his advertisements into jingles.

If he does so, he will achieve that prime requisite of good advertising—distinction. Indeed, his advertisements will be very different from the forms frequently seen. In any case, if he is not getting the largest returns for the money he spends in advertising, he must by some method make his advertisements stand out from the usual forms of offering accessories for sale. The rhyming advertisement offers this opportunity to a marked degree.

Getting Down to the Point.

Garage owners are inclined to run to stock phrases in their advertising. "Open all night" is one of these. It is usually read in the daytime, when the driver of a motor car is not in trouble and is not anticipating trouble, so that it doesn't fix itself in his mind. When he does get into trouble at night—on a lonely road somewhere—and goes to a farmer's telephone to summon help, he doesn't remember that casual phrase in the advertising.

The Acme Auto Service of Flint, Mich., has thought out this phrase of night service to the conclusion that it does not rest satisfied with the ordinary claim in that connection.

This garage advertises in a non-stereotyped manner to catch the eye of the man who has experienced trouble at night, and to remind him that he is likely to do so again. Just a change of wording, but it has had the effect of steering night calls automatically to the Acme.

"Ever have trouble with your car when driving at night?" is the arresting headline used on the advertising.

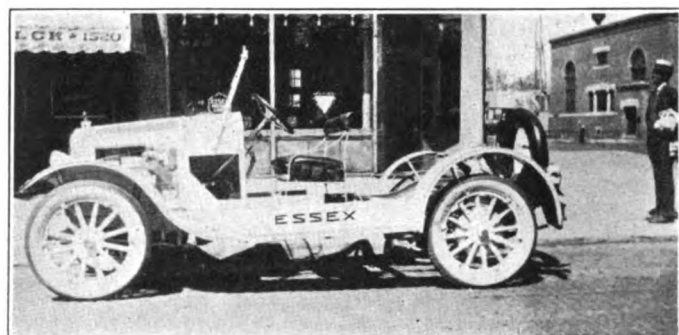
"Lots of little things can go wrong to spoil an evening's drive—a punctured tire, a broken light bulb, gas gives out, ignition goes wrong. We'll fix it for you in a hurry. We have battery and machine repairmen here until midnight."

That kind of advertising of night service means something to the motorist. He isn't likely to forget it, after once having read it, when he bumps up against any of the things that the advertisement mentions after night-fall. Being specific pays much larger dividends than being stereotyped or using stock phrases.

Novel Essex Good Advertising Feature.

The Hudson Motor Car Co. of Illinois, Evanston branch, has lately been using a novel demonstrator for advertising purposes.

This is an Essex chassis with regular fenders, running board, cowl, hood, windshield and lamps, and a special seat using



Novel Demonstrator Car Is Good Advertising Medium.

the Essex seat-cushion. The sides and top of the hood are fitted with glass, so as to make the engine visible. The car is painted white, while on each part—such as the carbureter, the gasoline tank, or the running board—words are painted in red, describing its salient features.

The Hudson company has found this Essex demonstrator an excellent advertising medium.

It Isn't "Dun" Any More.

Sometimes we glance at history with a shudder. We wonder how people sailed the seas in tiny barks without the comforts of a billiard room or a fresh water pool to cavort in. We actually tremble at the thoughts of cross-country trips on flat cars with no Pullman porter to dust off the "silk topper." Only abnormal times find us willing to submit to such things. Times have changed and with it customs, manners and habits.

Yet, with all this progression, there is one addiction which still clings fast in some quarters—the practice of dunning for money.

Dunning is as old fashioned as candles, and as out of place in the garage business as street cars are in Iceland. Dunning started away back in the days of the ducking board and lancing matches. It might interest you to know just what "to dun" means and how it started.

In the olden days there was a dialect spoken in the provinces of several countries and it included the word "dunny." "'Dunny' in this old-time slang meant 'Deaf.' Consequently, many thought the phrase 'to dun' really meant to 'deafen' with demands for money." It does, most assuredly, although the true origin of the word "dun" reaches a bit farther back in history. Some have also thought the word was derived from "domnes," meaning to give up.

The real truth of the matter is that Joe Dun, a famous bailiff in the town of Lincoln, England, became so active and so dexterous in his business of collecting debts

that, when anyone refused a payment or a loan, folks would say: "Why not Dun him?" This energetic Joe Dun also had a son, whom he made a bailiff, and the son, after his father's death, changed his name from Dun to Dunning. Hence the word Dun, now as old as Henry VII.

But Joe Dun's time has passed and so have his methods. Dunning is very destructive to modern business progression. Dunning provokes a man to pay, which is not in accordance with business ethics of the twentieth century. Once a customer is provoked, it is hard to resume business relations with him or her.

As a garage dealer it is well to avoid "dunning" for tardy bills from merchants, establishments and families with appeals of the following disturbing order:

Dear Sir:

On March 3rd, we mailed you a bill in the amount of \$92.50. It is still unpaid. Will you give this matter your early attention and oblige,

Yours truly,

The more successful method of collecting is in the application of salesmanship. Persuade your customer to pay—don't dun him. The following is a sales collection letter of the type that obtains the money without losing the customer:

Dear Sir: This is just a friendly reminder that you have overlooked the purchase of the motometer you were so kind as to select from our stock last December.

It just so happens that our business is of the type that calls for regular cash expenditure at specified periods to maintain our large stock and service facilities, so naturally we have to occasionally send out a reminder to our many good customers who have accounts standing.

I hope you will accept this letter in the kindly spirit in which it is written and let us have a check for \$10. Rest assured this consideration on your part will be highly appreciated.

With the best of wishes, we are

Sincerely yours,

Letters of the latter type—which are successfully used by many merchants—eliminate the need of "dunning" in the early and good-willed response they secure. Their very originality attracts attention and stands out from bills received from other merchants.

An Unusual Sign.

An Ashland, Ohio, tire dealer has a very unique and effective sign which comes in for a lot of favorable comment from motorists passing through the city.

Prominently located upon one of the

much-traveled thoroughfares of the community, this dealer has erected a large billboard sign, upon which appears a picture of a motorist who is having tire trouble. Directly in front of the sign, sitting upon a small stand, is an honest-to-goodness telephone and upon the sign appear the words:

"Don't Swear—Phone 110."

A Novel Way to Speed Tire Sales.

Crenshaw-Hider Co., tire dealers of Columbus, Ohio, have adopted an unique method of stimulating tire sales. In a recent issue of a local newspaper, this firm ran an advertisement which is shown in an illustration appearing on this page.

It announced that it will loan any responsible automobile owner a new tire or tube for over the week-end, affording the motorist protection against possible tire trouble on the week-end pleasure trip, at no expense to the owner.

Should the automobilist not use the tire or tube, he may return it by Tuesday and owe the company nothing. Should the automobilist, however, find use for it, he will pay for it. This should prove a wonderfully effective plan for stimulating tire sales in a very gratifying manner.

Another unique plan being employed by

NEW TIRES LOANED For Over-Sunday Touring

YOU can be protected against possible trouble with your tires or tubes over the week-end—No Expense to You. Come to our store. We will loan you a new tire. If you don't use it return it to us the following Monday or Tuesday. All responsible car owners are entitled to this service free. If you use the tire or tube you buy it. Remember the Sign—

FREE TIRE REPAIRS

TRY us once, let us show you our repair method is not equalled anywhere. You pay for these repairs. We give you a credit memorandum for the amount which you can later apply on the purchase of a new tire. This is your opportunity to have any make tire repaired FREE. Remember the Sign—

MICHELIN TIRES AND TUBES

TWELVE MONTHS' hard usage is not a fair measure of their service, nor perhaps twice twelve. Many MICHELIN TIRES are in use after three years. And they don't cost you as much as other makes.

CRENSHAW-HIDER CO.,
188 East Gay St., Between Fourth and Fifth
"THE BEST" Vulcanizers
Bell, Main 184. Open Evenings. And Sunday. Cts. 2322.

Unique Advertisement Which Has Greatly Stimulated Tire Sales.

this firm is to issue to each patron of its repair service for tires a credit memorandum for the amount charged for the repairs, which will be accepted at any time at its face value as part payment upon a new tire. This is an opportunity for automobilists to have tires repaired free—a feature that is always attractive.

Use of Trailers Still Undeveloped in France.

The use of trailers is as yet undeveloped in France and no statistics as to their number have been collected, says Commercial Attache Huntington. French military authorities placed large orders for trailers near the end of the war, but when the war soon ended these were left on the hands of manufacturers.

Little Ads That Pay.

When you advertise, do your advertisements say things—or just fill space?

A great number of the men engaged in the automobile tire service, repair and accessories businesses are advertising. Some are advertising, not wisely, but too much. That is, they use a lot of newspaper space but fail to say much of interest, which gets them nowhere. Others are advertising with the wisdom experience has given them.

Continuous advertising, in which the advertiser says things that are worth saying to prospective customers, is what pays—whether the space used is large or small. Even a very small advertisement, or a series of small advertisements, run continuously, will produce far better results than the “now you see it, now you don’t” sort. The man who hides himself and his business under a bushel basket, and then comes out once in a while is a sort of advertising spasm that lasts, perhaps, for a day or two, fails to make his copy pay him as it should or to derive much permanent benefit.

Advertise—and when you start, keep at it. Get in every issue of your local papers. That’s the idea. Keep your name constantly before the public so that they will have no excuse for forgetting you, your business or your location, for that is what makes bigger business.

Let us set before you, as examples, some good little advertisements that are paying the men behind them.

The copy shows what the repairman can do in a little space. These advertisements are proving productive:

MAGNETO REPAIRING Is a Fine Art

With me it is not merely the putting of parts together—each instrument must reach the highest degree of efficiency before it leaves my laboratory, that is why we handle only magnetos. ALL MAKES.

When a magneto does not come up to the proper requirements the owner is told so. My reputation is built on past performances and it is lived up to. I EMPLOY NO EXPERT.

J. O. Brouillet
61 Dresden St. Tel. River 3183

Have Our Skilled Auto Electricians Overhaul, Clean and Repair.

your starting, lighting and ignition systems this fall and winter—and avoid the troubles that develop from neglect of these delicate but vital parts of your car.

HERE is the equipment—the expert knowledge—the supplies, parts, etc., for really dependable service on GENERATORS, STARTING MOTORS, MAGNETOS, COILS, etc.

Henry L. Albee

The copy used by E. B. Atmus, who runs a combination supply store and service station, is another effort in the advertisement field that is proving to be quite productive:

Motor Parts Co. LET US TELL YOU Something About the Way We Handle Ignition, Starting and Lighting Problems

We not only sell the outfits, but we put them in, make repairs and adjustments, and keep them in shape.

We are not merely an over-the-counter store, whose interest goes as far as a sale, and no farther.

We are both a store AND A SERVICE STATION.

We sell, AND ALSO INSTALL, ignition, starting and lighting systems.

Our Men Are Factory-Trained Auto Experts

We understand all of the vexing problems of auto equipment, both gas and electric. Our experience and fine shop equipment are at your service.

“Selling, With Service,”
Is What We Offer.

E. B. Atmus

Successor to Motor Parts Co.
143 Chestnut St., Springfield.
Tel. River 949.

“Bardwell, the Tire Man”—that’s the way everybody refers to him in his own home town—believes in the use of small space also. He never leaves his copy out of any of the local papers for a single issue. Bardwell says it pays well. Here’s his style:

Vulcanizing and Tire Values

Do you realize how much valuation our vulcanizing process adds to your auto tires? Conceive, if you will, motoring without vulcanizing—casting aside half used costly tires because they have punctures and blow-outs and air holes, etc., which could not be remedied. Then figure what we save you by our vulcanizing.

Bardwell the Tire Man

48 Dwight St. Tel. River 7627

Making an Allowance on Old Tires.

Allowing a certain fixed price for old tires in figuring the cost of new ones is the plan adopted by the Chevrier Tire Co., of Bay City, Mich., with a view of stimulating sales of a new line of tires the concern has begun to handle. The plan has been heavily advertised in the newspapers and the publicity brought good results in inquiries and actual business.

While the allowance made is not large, necessarily, it is sufficient to furnish a motive for trading at the Chevrier store, particularly in the mind of the motorist who hates to throw away a casing no matter how badly it may be worn—and this man’s name is legion.

“Bring in Your Old Tires” runs the display advertising used. “We will make the following allowances on the old tire toward a new one, regardless of make or condition.”

The allowance was made to apply only on the one specified make of tire, in cords and fabrics.

Then followed a list of the various sizes of tires, with their list prices and the allowance to be made, followed by the net prices, as shown here:

| | List. | Allowance. | Net. |
|-------------------|---------|------------|---------|
| 30x3 fabric | \$12.00 | \$1.80 | \$10.20 |
| 31x4 fabric | 22.50 | 3.35 | 19.15 |
| 32x4 cords | 34.00 | 5.10 | 28.90 |

The advertising was carried through the whole run of sizes, in both cord and fabric, so that the motorist could see exactly what he would save by bringing in the old tire. In the larger sizes, making more profit margin, the allowance for the old tire was made heavier, and resulted in a considerable quantity of that business, since the car-owner with a battered 32x4 casing would much rather turn it in at \$5 or more and get a new cord from Chevrier than throw it away and pay as much or nearly so for a tire of some other make.

In addition, the concern advertises a free repair guarantee for six months on the fabrics and for a year on cords.

Spot-Light Catches Attention for Dealer.

Motorists traveling along a certain Los Angeles street at night are surprised to see what appears to be the two lights of a car coming from the side of a building. Owing to the nature of the surroundings, they cannot figure how a car could be in a position such as that. As they come opposite the lights, they read a bulletin board which is illuminated by other spotlights and that tells them of the purpose of the lights.

This is the method used by one dealer in accessories to catch the attention of drivers and then acquaint them with the fact that he is ready to take care of their spotlight order for them.

Coming from the opposite direction, the motorist’s attention is focused on a white signboard advertising spotlights—for the twin lights illuminate this.

Another stunt that got attention for a tire dealer was to put up in his window a set of tires used by a large trucking concern.

At one point along the coast, which is visited by hundreds of cross-country tourists daily, a life-saving post was planted in the window of a dealer. On it was hung, instead of the life-saver, a tire. A card on the tire read:

The Handy Spare—Your Lifesaver.

Just suppose—

1. You were late for the theater with your girl and the tire goes flat! No spare!

2. Your wife telephones in that she is 23 miles out and the left hind tire flat! No spare!

3. You are dressed in your Sunday best, showing some close friends the country and the right hind tire goes flat! No spare!

Wouldn’t you regard the spare as your sure-enough lifesaver then?

WELL, THAT TIME MAY BE SOON!

How Automobile Tires Are Cured

An Understanding of Curing Necessary for Best Appearance and Quality of Tire Repairwork—Gum Stocks and Their Composition—Two Kinds of Heat Which May Be Used Are Described—Other Essentials for Handling Cures

By H. J. White and Lowell R. Butcher
Instructors in Automobile Trade School, Des Moines University

It is, of course, necessary to have a repair built up correctly in order to insure the best results, but a careless or ignorant repairman may spoil both the appearance and quality of the work if he does not understand curing. A steam man must be able to set up his plant, detect, locate and repair any part of the equipment.

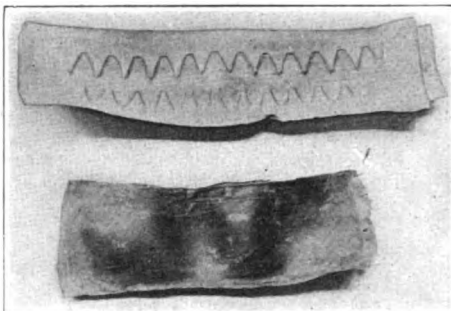
The successful vulcanization of a repair depends upon the use of a properly compounded gum, shaped to the required form and placed in a mold or appliance that will hold it to that shape. Heat is applied by using steam at a certain pressure and the rubber flows and sets, forming the repair. The time or length of cure, the degree of temperature and the use of hastening compounds will each help to determine the condition of the cured repair.

The gum stocks used in repairwork vary somewhat in composition so that the degree of temperature and the time required will differ according to the gum used. Tables are only approximate and the best method of determining the temperature and time required for a proper cure is to test a sample, varying these factors until the cured test piece indicates that the best results are being obtained.

A good test for a piece of cured rubber may be made by pushing a sharp stick or pencil into the gum. If the indenture remains after the pressure is removed, the gum is soft and undercured. If overcured it will be brittle and hard. A good cure

life, it will wear and crack rapidly. The gum in any good tire should pass this test.

Two kinds of heat may be used in the curing of repairs. Dry heat may be applied to the tire, no steam coming into con-



Top, Impression Pad; Below, Air Bag Pad.

tact with the tire, or the wet cure method may be used. In the latter method, the steam comes into contact with the gum to be cured and is used, for the most part, in large shops where retreads are completely cured at one operation in a steam kettle large enough to hold several tires. The ordinary repairshop uses only the dry heat method, the heat being applied through molds, steam bags, plates and tubes.

Most repairshops have a special boiler—heated either by gas or gasoline—that supplies steam at the proper pressure to the curing equipment. In some cases it will be convenient to attach to a steam line used for power, but these cases are rare and it is usually better to have a separate boiler where the heat can be regulated independently. No matter what means of generating the steam is employed, there should be a pressure of 75 to 80 pounds at the boiler, as the pressure will reduce by the time it reaches the molds.

Molds have petcocks placed at both top and bottom. These should be blown off before using the mold, and several times each day to allow any water or pocketed air to escape. It is well to have a pressure gage, both at the molds and at the boiler. Gages are not always reliable, and a thermometer should be used to check against them as the temperature will always vary with the pressure.

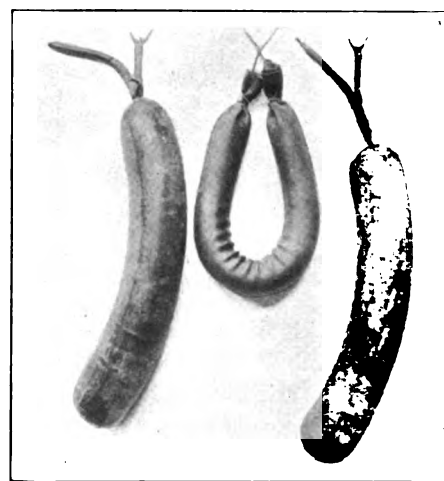
The steam should enter the molds at the highest point and the return should be from the lowest. If a non-return system is used, the steam, after passing about the molds, is condensed, trapped and drained into the sewer. In a return system, the steam returns to the boiler. The drain line should always be free of water and it is a good

plan to have a water-glass placed in this line as a check.

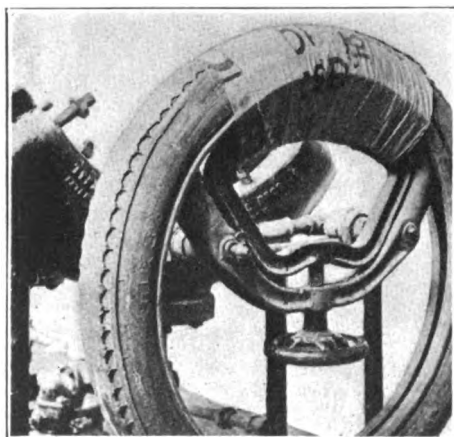
All plates and molds should be cleaned occasionally. Fine emery paper on a stiff bristle brush is useful in removing the burnt rubber and soapstone. A wire brush should not be used as it is apt to scratch the mold.

In curing a repair, some method must be used to preserve the shape of the inside of the tire and to press the repair firmly against the mold. Air bags are generally used for this purpose and may be had in the desired lengths and sizes to suit the requirements of the shop. These are made of fabric and rubber, shaped to fit the inside of the tire, and have an air hose for inflation. In some cases a small quantity of water, about half a teacupful, is used in the bag. The manufacturer of the bag will state whether or not water should be used in the bag and his instructions should be carefully followed.

As the purpose of the air bag is to supply a pressure to the inside of the tire, it must be a good fit. Padding may be used to fill in with if the bag is not large enough. Air bags are made to stand pressure but no large amount of expansion. They should be tested frequently for leakage, as an air bag that develops a leak during a cure will almost invariably ruin the repair. It is a good plan to test the pressure during the cure. This can be done with an ordinary



Outside Figures, Types of Air Bags. In the Center is a Sand Bag.



Showing the Method of Curing on an Inside Arm Vulcanizer.

should be solid, yet resilient enough to force out any indenture made on the surface of the gum.

In passing, it might be well to state that this is also a very good test for the rubber in a tire. If the gum is dead and without

tire gage and will inform the repairman as to whether the internal pressure is being kept up.

It should be remembered that the pressure of an air bag will increase when the bag is heated, due to the expansion of the

air. Hence a bag must not be inflated to the pressure desired. Experience shows that this expansion is about 20 per cent, or an air bag should have an initial pressure of only about 50 pounds to secure a 60-



Method of Fastening Impression Pad.

pound pressure when the bag is heated.

A bag that is slightly shorter than the mold is usually better than a longer one. This prevents riding at the end of the bag and makes a more even repair.

The air bag—together with any filling that may be used and the interior of the tire at the point of repair—should be dusted with soapstone when setting up for the cure. This will prevent sticking. It is poor practice to warm up the air bag by placing it in the mold before using; such a method will ruin the rubber of the bag and shorten its life. An air bag that is properly used and cared for should handle at least 100 cures during its useful life. Some repairmen obtain as high as 500 cures with the same bag.

After finishing a cure, relieve the pressure of the bag before removing the tire from the mold. Then, before the bag has had time to cool off after being removed, inflate it slightly to keep it from buckling as the air contracts. Air bags should not be allowed to lie about where they are liable to a puncture. Hang them up where they will be out of the way.

If an air bag sticks in the tire it should not be removed by pulling on the hose. Press the tire against the floor. This will spread the tire and the bag can readily be removed.

Leaks in bags may be stopped by introducing a mixture of fine corn meal or flaxseed with a little water into the bag. A mixture of soapstone and vulcanizing cement is sometimes used, but either method of repair is only temporary.

Some repairmen will use substitutes for the air bag. A rubber block may be used, which is expanded at the repair by pressing the ends of the block together. An old inner tube, filled with sand, is sometimes used. But no matter what method is used, be sure that the tire cavity is well filled. One of the illustrations shows two air bags and a sand bag—the sand bag in the cen-

ter and an air bag on either side of it. Pad the air bag when possible as this gives better pressure without unduly stretching the bag.

Pads for this purpose may be made from the carcass of an old tire, as shown in one of the illustrations on the preceding page. One, two or three plies may be used, as required. It is best to cut these about 3 or 4 inches longer than the bag used and step them down on the inside in $\frac{1}{2}$ -inch steps so as not to crease the inside of the tire. If the bag does not come high enough at the beads, strips of inner tubing can be placed under it to raise it or a bead pad may be made from an old tire flap and placed above the bag.

To keep the gum from burning and sticking to the mold, heat cloths should be used in the cure. These are applied wet and cover the inside of the mold, keeping the tread and sidewalls of the tire from coming into direct contact with the mold. When saving the pattern on non-skid treads, they prove useful in holding the soapstone in place. Holland, or the protecting cloth that repair material is rolled in, makes very good heat cloths.

Soapstone was mentioned as a material



How Impression Pad Is Placed.

for use in the mold. It prevents the sticking of gum to metal or fabric and should be used in the powdered form. A quantity of this, tied in a loosely woven cloth bag, provides a convenient means of dusting all new gum and the mold when setting up for the cure.

To save the non-skid impressions adjacent to the repair, water and soapstone are mixed until a thick paste is formed. Apply this in the crevices of the non-skid design and cover with a wet heat cloth. Soapstone should not be used against the raw gum, but simply to keep the overflow of gum from filling the non-skid impressions next to the repair spot.

A mixture of soapstone and light brown cement makes an excellent paint for the inside of the tire. This may be thinned with a high test solvent, which will evaporate after the paint is applied and leave the soapstone sticking to the inside of the tire.

In repairing or replacing a tread section of a non-skid tire, it is necessary to have some method of keeping the original design of the tire. Otherwise the repaired spot will make a smooth spot on a non-skid tire, as the tread design is flattened and pressure cannot be applied to the low spots. A practical way of securing a good pressure on the tread at all points is by the use of an impression pad.

An impression pad consists of a base of fabric with a coating of gum, that is molded to fit the tread of the particular tire to be repaired. Thus it will be seen that it is necessary to make impression pads to suit the design of every tread that the shop encounters. Non-skids wear down in service and it is best to take an impression from the tire to be repaired so that the repaired section will match the rest of the tire. One type of impression pad is shown with the air bag pad illustrated.

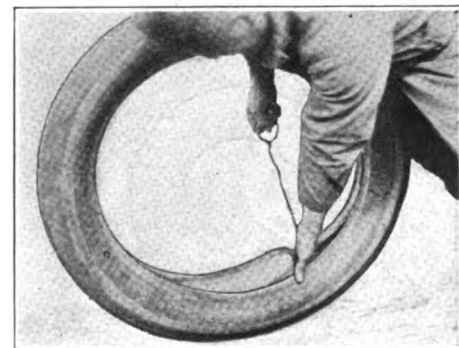
Many methods of making impression pads are used, but the following two are chosen because of their simplicity and economy:

The pad should be $1\frac{1}{2}$ ins. to two inches longer than the mold at each end—that is, the impression pad will be three to four inches longer than the mold in which the tire is to be cured. This will keep the mold from making an indentation at each end. Especially is this true if the air bag is a little longer than the mold.

Two strips of fabric are cut from an old tire. The first should be an inch wider than the tread of the tire. That is, it will extend $\frac{1}{2}$ -inch on either side of the tread. The second strip of the base is cut as wide as is possible, yet clearing the bead plates.

After applying three coats of cement to one side of each strip, two layers of tread stock are sandwiched between the strips. This tread stock should be cut the same width and length as the narrow strip. Occasionally it will be best to use three layers of the tread stock if the impression to be taken is a deep one.

Select a portion of the tire which will give a good impression and wash it thoroughly, after cleaning with a wire brush



Removing an Air Bag from the Tire.

or buffer. Soapstone is applied to the tread after dampening it to make it stick better. Likewise soapstone is applied to the pad to keep it from sticking to the tire.

The narrow side of the pad is now ap-
(Concluded on page 38)

Welding, Cutting and Brazing Practice

This Article Is Devoted to a Discussion of Expansion and Contraction as Applied to the Main Run of Automobile Repairwork Wherein Gas-Welding Torch Is Employed—Outside Influences Should Be Given First Consideration

By David Baxter

In preceding articles we have touched upon the subject of expanding and contracting metals, insofar as it is related to oxy-acetylene welding in general. But this is a large subject and cannot be covered in an article of this kind—even when dealing solely with welding as it is done in the garage or automotive repairshop. So this discussion will have to be handled somewhat in the abstract.

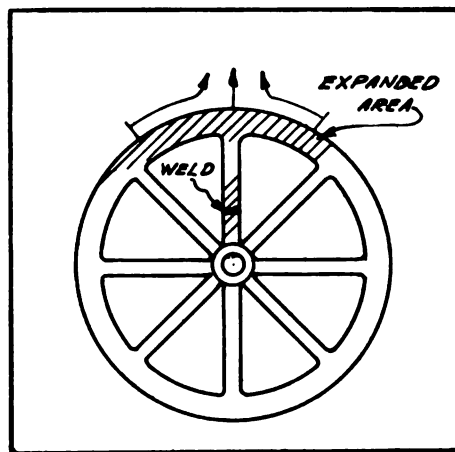
The theory is practically the same in general repairwork and automobile repairing, but the application is more along one line in the automotive shop. The actual practice is not as complicated as it is in shops where all kinds of heavy welding are done.

Therefore, let us devote this chapter to expansion and contraction as it applies to the main run of automobile repairing, wherein the gas-welding torch is employed.

Probably the first thing for the beginner in torch welding to consider in regard to expansion and contraction is that the scientific theory of anything is nearly always restricted or controlled by outside influences—that the theory of a section of metal expanding a certain amount when heated to a certain temperature is so influenced by surrounding conditions that it is not always practical except as a fundamental rule.

For instance, the student is told that cast iron contracts $\frac{1}{8}$ -inch per foot upon cooling to normal after being heated, but he will find that the rule varies with the grade

simple way to explain the phenomena of expansion and contraction. Suppose we take a dry sponge to illustrate the point. Pour a little water on one part of it and this part will immediately commence to



Heated Section of Rim Forced Outward by Expansion. Arrows Indicate Direction.

swell or to expand. Then pour heat on iron or, in other words, apply the intense heat of the welding flame to the metal. It immediately starts to expand or swell in that part.

Now, the more water that is poured on the sponge, the more will it swell or expand. Part of this is due to capillary attraction, which causes the water to pass to other parts of the sponge until the whole of it is expanded to its full extent. Now apply more heat to the iron. In other words, pass the welding flame over a larger area, and more of the metal will expand.

Here again the similarity is carried out, but this time it is conduction that causes the heat to pass to other portions of the metal and causes them to expand also. Just in proportion to the amount of conduction will the area of metal expand, the same as with the capillary attraction in the sponge.

When the sponge is wet all over it expands to its limit, and when metal reaches a certain stage of heat all over it is also expanded to its approximate limit. What is scientifically termed the "point of saturation" is attained. The sponge will hold no more moisture without allowing it to drip out and run away. The metal will absorb no more heat without melting and running.

This analogy might be carried considerably farther—such as the fact that the slower the water is applied to the sponge, the slower will the swelling be; and the faster the heat is applied to the casting,

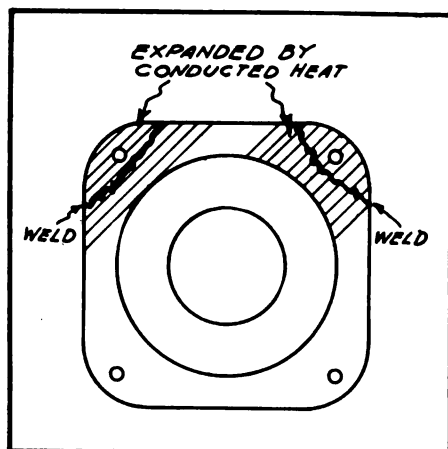
the more rapid will the expanding be. Evaporation and radiation, in both cases, retard the action.

To paraphrase the analogy: This swelling or expanding is an effort on the part of the sponge and of the metal to occupy a larger space than it did at its normal state or temperature. The heat causes the metal to occupy a larger space than it did when cold.

On the other hand, the parallel is still a good comparison, in which case radiation and evaporation are synonymous. As the water evaporates, the sponge shrivels or shrinks in its outside dimensions. When perfectly dry, it will be very nearly its original size. The changes in physical structure may prevent the sponge from assuming its first size. As metal cools, due to the heat radiating to the atmosphere, it shrinks, or the space it occupies grows smaller. The rapidity of this action is gaged by the rapidity of the radiation, the same as rapid evaporation dries the sponge.

This parallelism of the sponge and the metal can no doubt be followed out in other details—such as distortion, elasticity, fracture, etc. This is scarcely necessary, as the student should now be able to have a fair understanding of the heat reactions of metals. So, let us consider the question from the standpoint of metals alone.

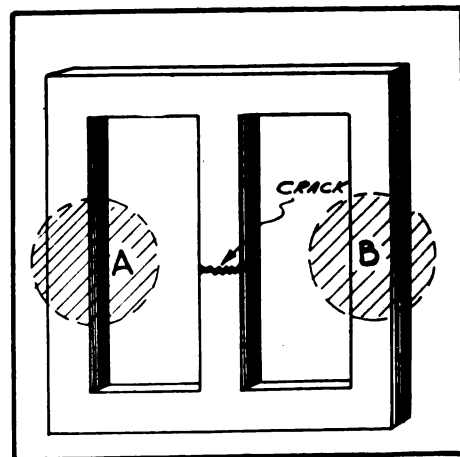
It should be obvious that the heavier sections of a casting take up the heat slower and are, therefore, not so rapidly expanded



The Welder Finds Nothing Here to Resist Contraction.

of metal. However, he will find this a safe rule to follow after he understands the other complexities of the work.

Keeping in mind the effect of outside influences, let us see if we can find some

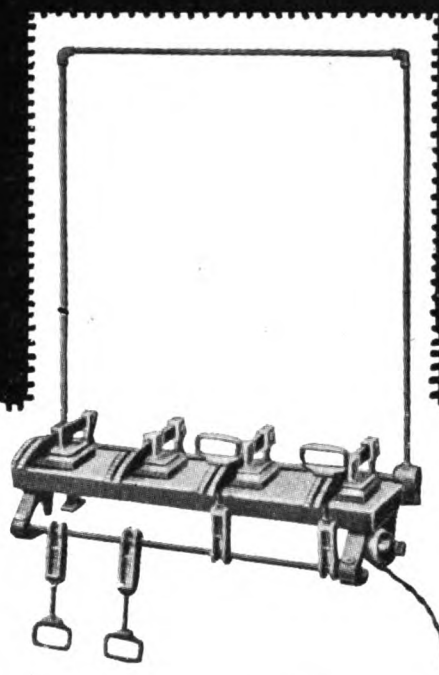


Heat at A and B to Spread Crack and Furnish Follow-up Expansion.

as the lighter parts—the heat applied to both being the same. Then it follows that the heavier parts of a welding job will contract, or shrink in size slower than the lighter parts. That is, the heavier parts

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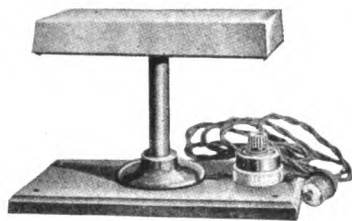


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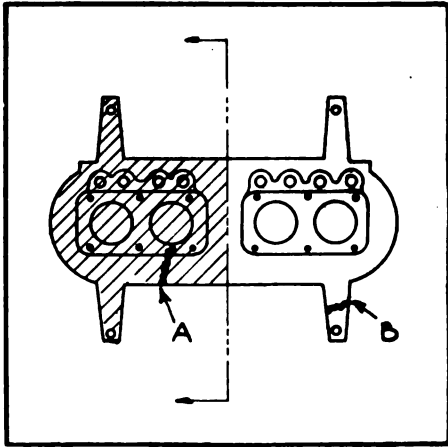
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will retain the heat longer and, therefore, contract last.

Herein lies the problem of the torch welding process. The welder must know how to prevent the heavy parts from damaging the lighter parts, as they cool and contract



Preheat This Half of Case to Relieve Contraction Pull of Weld A. No Resistance to Contraction in Weld B.

after the light parts are practically all contracted. In other words, the light parts will be fully contracted while the heavy parts are still shrinking.

The result is that the casting is liable to crack where the greatest stress comes, provided the light sections cannot be drawn inward by the pull of contraction in the heavy parts. Perhaps we should say that the parts contracting last are liable to pull the contracted parts in two.

If the light section is held rigidly back by some other part of the job, or on account of its peculiar shape, then the pull of contraction will crack it at the weakest point.

This danger, however, is overcome by having the restraining parts of the casting expanded enough and in such manner that they may cool and contract in unison with the heavy sections. The contraction of one part literally follows the contraction of the other inward.

This brings us down to a closer application of the shrinkage theory which, in a few words, is that the weld and filler metal applied to the weld are fully expanded when added to the fracture. If the weld is located between two rigid sections, the pull of the weld contraction will cause a fracture either in the weld itself or the weak part of the casting, provided steps have not been taken to overcome the action. This usually means if the job has not been properly preheated. Probably we should say properly pre-expanded, for that is what preheating really amounts to.

If the job has not been pre-expanded before applying the weld, it will naturally be rigid when the weld shrinks and will, therefore, resist the action of the cooling weld. If it is a cast-iron casting it will crack somewhere. If it is a steel or wrought

iron job it may be warped or pulled out of shape instead of fractured.

In the first instance, if it were possible to apply a weld of exactly the same width and thickness throughout its entire length, the problem of controlling the contraction would be simplified, since the whole of it would shrink in the same proportion. But the average weld is thicker in some portions and wider in some parts than in others. This makes for irregular contraction in the weld and causes the necessity for pre-expanding, which could otherwise be omitted in many cases.

When welding sheet steel or wrought iron, it is practically impossible to take advantage of the contraction by preheating. More mechanical devices are employed—such as spreading the parts at one end of the weld seam in order to permit the weld contraction to draw them together as the weld metal cools behind the torch.

Mechanical devices also are often used when welding castings. Jack-screws, wedges, and clamps are employed to spread the fractures so that, when released, the parts will follow the weld contraction inward as the weld cools.

Between expansion and contraction, in automobile repair welding, the latter is no doubt the torch operator's worst enemy because it is during the reaction that the casting is damaged—scarcely ever as the result of expansion. The breaking stress occurs when the weld cools and starts to pull upon the surrounding casting metal.

If the beginner can grasp this idea and remember it, he is in a fair way to learn how to control expansion in all its forms; that is, he can readily learn to make the expansion take care of the weld contraction by so arranging that the shrinkage does not pull directly against the rigid parts of the job, or by so arranging that these parts will follow the shrinkage of the weld metal inward.

By "weld metal" is meant the new or filler metal added to the fusing weld, together with an area of an inch or more on each side of the weld which has been heated by the welding flame and the conducted heat. Conduction could be termed absorption in this case.

So, we repeat, the shrinkage of the fully-expanded weld metal is the seat of nearly all welding troubles insofar as fractures and distorting are concerned. When the welder once learns to picture the reactions in his mind when he starts the job he will have little trouble in any welding job, for he has but to arrange the work to that end.

Let us take several familiar examples of automobile welding to illustrate the theory as explained here, with all due respect for complications of casting design and metal structure. Take first the case of a gear with a spoke broken near its center. To follow out this theory, then, we should endeavor to spread the crack enough that when the weld metal cools it will not pull away from the rim. This is most easily

accomplished by heating the rim at the outer end of the broken spoke. The heating is done with the welding flame or any handy agency.

As the heated section begins to turn red, it endeavors to occupy a greater space. The cold part of the wheel is rigid which, together with the curved shape of the wheel rim, tends to throw the heated section outward and thus widen the crack in the broken spoke.

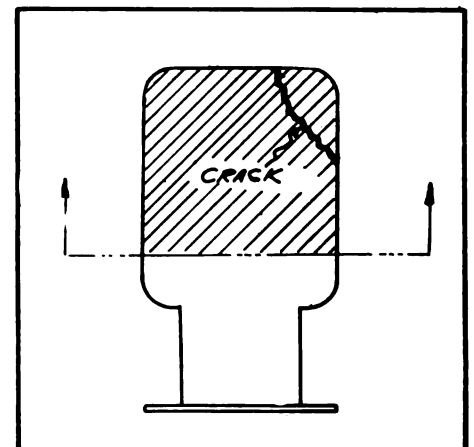
In other words, as the heated section of the rim expands it is prevented from increasing in length by the rigidity of the balance of the wheel. As the expansion must take place, it naturally bends the rim outward or out-of-round. It is this action which opens up the crack and provides the follow-up contraction when the job is permitted to cool.

When the weld is finished, and it and the heated rim section are allowed to cool in unison, the contraction of the weld is followed inward by the rim contraction, thus preventing a new fracture.

The amount of spread in the original fracture has something to do with the success of the idea, because it can be too much and thus cause the wheel to be out-of-round when finished. It can scarcely be too little since the rule of shrinkage mentioned earlier in this discussion figures out but a very small fraction of an inch on such small jobs as automobile gearing.

For instance, if the gear at hand is a foot in diameter, the contraction, based upon $\frac{1}{8}$ -inch per foot, would be very little, since the weld area would probably be only an inch wide across the spoke. In other words, approximately an inch of the length of the spoke would be fully expanded.

By the rule, then, the expansion of the weld would be but $\frac{1}{8}$ of $\frac{1}{8}$ -inch. There-



Great Resistance to Pull of Weld Contraction in Cracked Water Jackets. Preheat at Least Portion Above Dotted Line.

fore, the rim is expanded enough to open the fracture but little more than 0.01 inch, or approximately so. As soon as the weld is finished, it is allowed to cool and shrink, this action being followed inward by the

(Concluded on page 46)



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HOW AUTOMOBILE TIRES ARE CURED.

(Concluded from page 33)

plied to the tire, taking care that it is kept straight with the tread. Fit an air bag to the tire and place the pad and tire in the mold for cure. The cure should be for about 45 minutes at a temperature of 278 degrees Fahr., after which the tire and pad are removed from the mold. The pad is now ready for use.

Another type of pad may be made, using but one strip of fabric as a base. This works quite well if but few cures are to be taken from the same pad. The one strip of fabric is cut as the wider one was in the preceding method. Two layers of tread gum—the same width as the tread—are placed on this and the pad completed as in the first method. With this pad, the gum comes into direct contact with the tire, while in the first they were separated by a layer of fabric.

In using an impression pad on a repair, the design must be matched exactly with the tread. This is best accomplished by matching one end and fastening it in place to the tire with a strip of cloth or a daub of cement. Stretch the pad carefully against the tire and fasten the other end in a like manner. After the tire is in the mold these fastenings are not necessary.

Curing time for a repair must be a little longer when a pad is used, due to the time it takes to heat a pad through. This will be from 15 to 20 minutes longer. It is a good plan to heat the pad in a mold before applying.

In other articles, the specific method of handling cures of different kinds of repairs will be taken up, but the general practice for the types of repairs are here outlined.

A rebuild job can be cured in a regular mold, by curing in hitches, or it may be cured in the steam kettle. Few repairshops can afford the installation of a kettle, so the sectional method is the one generally employed.

The cure for a retread is similar to that of a rebuild, and the sectional method is always used in the smaller shops. The mold in this case should be long enough so that the tire can be cured in three hitches.

A reliner may be cured in a regular mold with an air bag or in a steam kettle. Perhaps the most common and practical way is to use the inside vulcanizer and cure the work a section at a time.

A complete section is handled in the regular mold with the air bag. Partial sections are cured in exactly the same manner.

A tread section may be cured in a regular mold with the air bag, or may be repaired on the inside vulcanizer, using a patch vulcanizer at the same time.

Bead sections, replaced staples in the beads and rebuilt sides may be cured in the regular mold or with a sidewall vulcanizer. The use of the regular mold is common in the smaller shops where a sidewall vulcanizer is not to be found among the

equipment for handling tire repair work.

Tread patches may be handled with the regular mold and air bag or with special blocks and patches.

It will be seen that many of the repairs have optional methods of cure. A large amount of equipment is not necessary to do good work. An ingenious repairman can improvise curing methods for many

Air Bag Inflation Table.

| Size Bag in Ins. | Pressure in Lbs. |
|---------------------|---------------------|
| 3 | 55 |
| 3½ | 60 |
| 4 | 60 |
| 4½ | 70 |
| 5 | 75 |
| 6 | 85 |
| 7 | 95 |
| 8 | 100 |

Pressures in Pounds for Various Sizes of Air Bags.

repairs, even though he does not have elaborate equipment. But he must keep two things in mind—the application of an even pressure, and the proper heat.

TAKING CHATTER OUT OF FORD

(Concluded from page 24)

If the car is equipped with a starter, it must be taken off before the cover is removed. There are four screws in the Bendix-drive cap and in removing these it is advisable to leave the one just below the pedals in place, as it is almost inaccessible. This can be accomplished by slotting the Bendix-drive cap, so that it will slip off the screw if moved to one side.

It will be found that most of these caps are already slotted, although early models are not. If this is not found to be the case on the car you are working on, it will save your time and patience if you will do this before you replace it.

After the transmission cover is removed, the bands are taken out and new linings installed, or they may be exchanged at the Ford service station for bands already relined. Some difficulty will be experienced in removing and replacing these bands if the three sets of triple gears are not in the proper position when doing the work. One set of triple gears should be about ten degrees to the right of the top of the transmission. In this position, removal of the bands is an easy matter.

Before replacing the cover all old gasket material must be carefully scraped away, and new gaskets installed. Shellac is generally employed in replacing these, but it is advisable to leave the top of the gasket free from the adhesive. The two cork side-gaskets are first put into position. Then a felt front strip, soaked in shellac, is put in place and the ends tucked down in the transmission alongside the magneto coil. Two small inch pieces of felt, or rolls of candle wicking, are tucked into the corners, and then another unshellacked felt strip

placed over the whole and the ends lapped over the ends of the cork gaskets. It is very important that the gaskets be in this position. Otherwise oil leaks would result, and that would mean several hours' work for nothing.

Particular care must be taken in placing the felt strips or candle wicking in the corners, for it is there that oil leaks begin.

In replacing the cover, some means must be had to hold the bands together so that they will slip into their respective places with the aid of a screwdriver. The usual procedure is to tie the bands together with string or wire and, when the cover is in place, to remove it.

This method is a poor one, for the bands do not draw up uniformly, and often the string breaks—if string is used. Consequently, considerable trouble is experienced in replacing the cover.

A better and more efficient method is to make a band clamp out of 5-16-inch rod iron. The clamp is made U-shaped. It is easily removed before the cover is completely down in its place.

After the cover is in position all bolts and capscrews are fastened loosely until they are all in place. Then they are drawn down together. This accomplished, the bands are adjusted. It is important that they be left as loose as possible until they become set, for the life of the lining depends upon this.

Some garages soak the linings in oil before they put them into use. This seems to improve their condition and is a good stunt to try.

Very good results are said to be obtained from the so-called "cork insert" linings, but it is well to bear in mind that no lining will "stand up" unless properly taken care of.

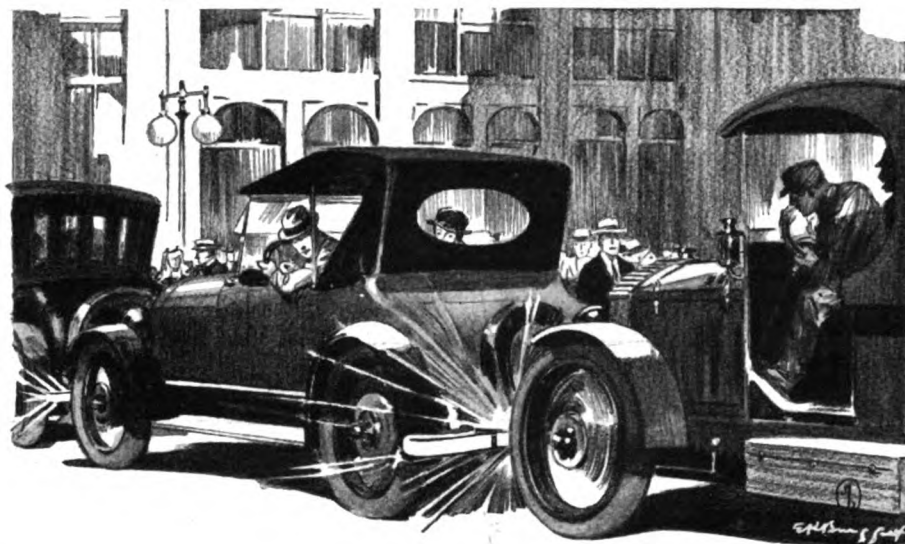
Some automobile owners let the bands become so worn that they cut grooves in the transmission drums, and no band will work properly under these conditions.

Fundamental rules to observe are: Keep good oil in the crankcase and change it often. Don't have bands tighter than necessary.

Damascus, Syria, a Poor Automotive Market.

The present time is not opportune for establishing American agencies in the state of Damascus, says consul Charles E. Allen, the demand for motor cars being too limited. Many lines are already represented in Beirut, and American manufacturers contemplating to enter this territory should intrust their products to a reliable house in that city, allowing the latter to include in their territory the state of Damascus.

A trading corporation, with Syrian headquarters in Beirut, is the only concern having a serious local establishment. It endeavors to do some repairwork, but is obliged, in almost every case, to bring accessories from Beirut.



Bumps Come Front and Rear

EVERY day more and more motorists recognize this fact—they realize that collision damage is costly; that they must safeguard themselves against the other fellow's carelessness.

That's why we have increased our capacity to 5000 Lyon Spring Bumpers per day—we know, and careful drivers know, that Lyon Spring Bumpers are the best collision protection any car could possibly have.

**Prices range from
\$10 to \$23**

Car Dealers: Our bumpers are manufactured under basic Lyon patents. More than a million Lyon Bumpers are already in service.

Jobbers: If your stock doesn't include Lyon Bumpers, write to us; our proposition will benefit both of us—it is fair and square.

More Lyon Spring Bumpers are sold than all the others put together. Isn't this conclusive proof that they are the fastest selling accessory that your shop could handle?

Lyon Spring Bumpers are noted for their two-piece overlapping front bars and the open "looped-end" construction which gives them a resiliency and

damage-resisting power that no other bumper can equal. We guarantee them to take any blow at the speed of 15 miles an hour without damage to the car or its occupants.

Insurance companies recognize the superiority of Lyon Spring Bumpers—they make a 12½ per cent reduction in their collision rates when a car is Lyon-protected front and rear. Incidentally, here is a mighty convincing selling argument for you, because the reduction is enough to pay for a pair of bumpers.

It will be well worth your while to stock Lyon Spring Bumpers; they are always in demand. They sell quickly, netting you a good profit. Then, too, you're backed up by national advertising that paves the way for many sales.

Over a million in use

METAL STAMPING COMPANY, Long Island City, NEW YORK



Lyon Straight-Bar Bumper



Lyon Convex Bumper

LYON

RESILIENT BUMPERS

"Aerial Railway" Interests Many

Kansas Garage Installs Overhead System That Attracts Interest and Adds to Shop Efficiency—Conveyors Not Only Carry Heavy Parts from One Section to Another, But Are Used to Elevate Cars for Mechanical Work

By Orin Crooker

When the Schollenberger brothers, of Wichita, Kans., opened their new garage two years ago, the building and its equipment impressed many who inspected it as having been devised and planned by an efficiency expert.

It seemed as though every modern tool, machine and fixture needed in modern automobile service work had been included. From the very first, however, the elaborate system of overhead conveyor tracks installed in this plant has held the center of the stage, as it were, and has compelled the instant attention of all who have occasion to enter the building.

"Interest in our 'aerial railway' never seems to wane," said one of the Schollenberger brothers recently. "Almost everyone who comes in here spends a little time watching our men make use of it in the several ways in which it is made to lend efficiency to our work."

Believing that there must be a "story" involved in this particular installation, Mr. Schollenberger was pressed for the facts.

"A few years ago," he replied, "one of our best mechanics was on the floor beneath a car when another car bumped into the one under which the man was working. The automobile which was being repaired had a wheel off and was setting on a jack. The light impact was sufficient to overthrow the jack and let the car down upon the man beneath. He escaped instant death only by what appears to have been a miracle.

The memory of that narrow escape re-



Quick Repair Service Department Where Minor Adjustments Are Made.

mained so vividly with all of us that, when our new building was planned, one of the chief things we insisted upon was the installation of an extensive system of overhead carriers, which—in addition to conveying heavy parts from one section of the plant to another—could be utilized, through the use of chain hoists at any point on the system, for elevating cars for mechanical work without the employment of jacks.

After two years in our new building,

I do not hesitate to say that, viewed merely as a 'safety first' installation, the overhead tracks have proved to be all that we hoped. We have dispensed altogether with the use of jacks in our repairshop, and our foreman has standing orders to dismiss any man he finds working underneath a car supported only by such means."

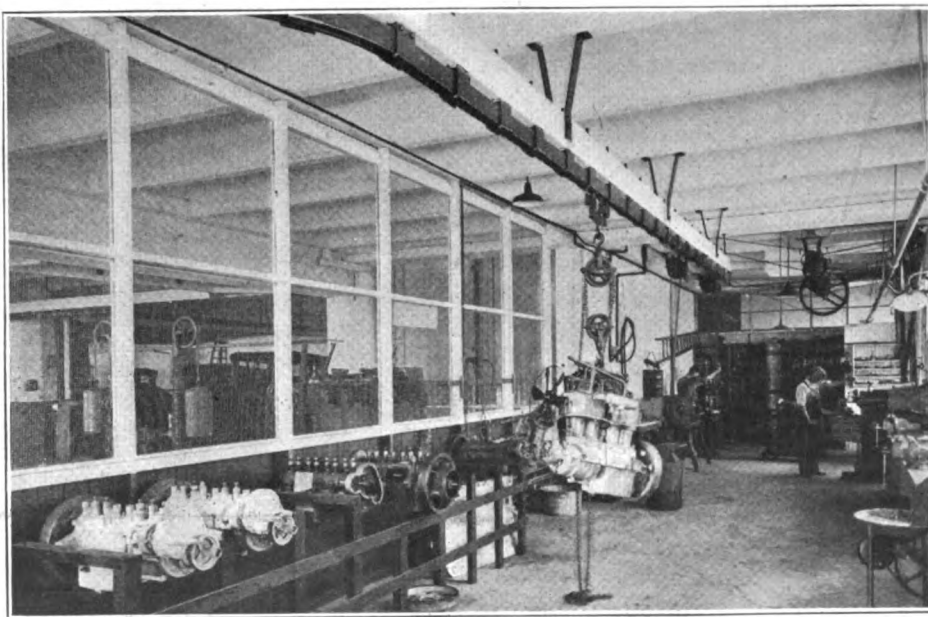
The illustrations will give the reader a good idea of the extensive installation of ceiling track employed in the plant of this Kansas automobile firm. In one of them is shown the quick repair service department, where minor adjustments are made.

This department is on the first floor, with driveway doors opening on the street. If it is found that a car needs more overhauling than was anticipated, a couple of chains are put under it, the hoists swing it clear of the floor, and the overhead track serves to convey it out of the room and onto an elevator which carries it to the floor above.

Here the main repair department is located. Should it be necessary to take the car to pieces, the various parts may be carried direct to different benches in the machine room, on the same floor, by means of the carrier track.

There is no lost motion and much valuable time is saved, for which customers otherwise would necessarily pay.

"The overhead system," continued Schollenberger, "is being used by us in a dozen different ways every day. In fact, it



Overhead Track Carries Car to Elevator Which Takes It to Main Repair Department on Floor Above.

(Concluded on page 44.)

Make Your Store the Most Talked of in Your Town

The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En-ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.
It is **not** given away.
It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

This service is supplied only to dealers who sell En-ar-co brands. The Boy and Slate Sign and every one of the Epigrams are copyrighted.

There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

Write today for full particulars. Learn all about the Big En-ar-co Boy and Slate Sign, the epigram service, and the other advertising helps we give our dealers. Be the first in your community to get started. Use the Coupon. Use it Now!

THE NATIONAL REFINING COMPANY

National Headquarters, P-731 National Bldg., Cleveland, Ohio
4 Modern Refineries : 93 Branches

THE NATIONAL REFINING COMPANY,
P-731 National Building, Cleveland, Ohio

Without obligation to me please send full detailed information regarding the En-ar-co "Boy and Slate" and Epigram Service, and other advertising helps.

Name.....
Address.....
City..... State.....
I now sell..... Oil.



"Seen and Heard in Garages"

Some Hints on Putting Up the Spare Tire—A Suggestion for a Home-Made Bake-Pan Forge That Has Many Uses in the Garage—A Visit to One Garage Uncovered a Good Method for Loosening "Stuck" Nuts, Which Is Described

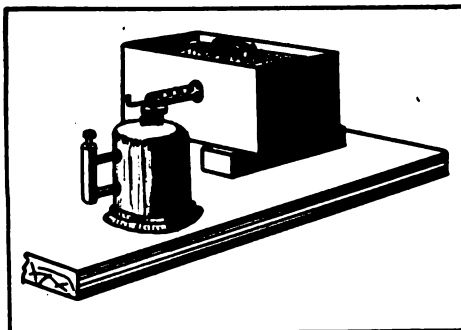
By James F. Hobart

"When you put up a spare tire," said a garageman, "be sure that it bears snugly against both of the side supports. The tire rests upon the bottom support, of course, and unless you take special care to adjust the side bearers or supports according to the size of the tire, there will be a looseness of the tire against the side supports, no matter how tightly the fastening straps may be drawn.

"Whenever there is a looseness between a spare tire and its supports, there may be wear. Grooves, $\frac{1}{8}$ -inch deep, have been found in tires where the loose side supports had worn into the thread of the tire."

Usually the side supports may readily be driven one way or the other, so as to bear snugly against the spare tire. If a blow or two from a block of wood against a side support will not move the support, then remove the nut which fastens the support in place and spread some cup grease over the rusty surfaces of the support-rod and the hole into which the rod fits. Then tighten the nut and perhaps put on a lock-nut, so as to hold the support firmly but loosely enough that it can be driven inward against a smaller tire and driven outward when a new and larger one is to be placed upon the spare-tire carrier.

Tires vary in diameter according to the make and the wear. Therefore the side supports must be moved inward for a worn tire and outward when a new one is "put up." Another thing to be careful about is the placing of the straps which fasten the tire to the three supports. Be careful to draw the straps tightly enough to prevent



Bake-Pan Forge Has Many Uses.

the least motion between the tire and the supports.

Be very careful, indeed, about strapping a slack tire in place, and then pumping it up after the straps have been drawn tight. There is almost a certainty, if you pull the straps tightly enough against a flat tire to prevent chafing against the side-supports,

that when you pump up that tire while strapped in place, the straps will be torn where the buckles bear or, more likely, the straps will be torn completely in two.

The tire becomes larger when pumped up, thereby placing a great strain upon the straps which should be observed closely when a flat, strapped tire is pumped up, and also when a pumped-up tire is allowed to become soft or flat. Then the straps must be tightened or the tire will chafe—but be sure to loosen the straps again when you pump that tire.

A Bake-Pan Forge.

A small job of forging was absolutely necessary, there was no forge available and some control rods had to be given short bends which could not be made cold. The last cold chisel was getting too blunt to be easily ground, and there was no time for a trip of three miles to the nearest blacksmith shop.

A workman picked up a sheet-steel baking pan containing small parts from an automobile. He emptied the pan and chiseled a hole in one side, about $1\frac{1}{2}$ inches in diameter. He pushed a bit of steam pipe into the hole and packed the pan full of moist dirt. Then he dug a hole with his fingers, down to the inner end of the pipe which was in the middle of the pan. Next the pipe was carefully withdrawn, leaving a hole in the dirt.

As shown in the illustration, the pan was blocked up on a couple of bricks, high enough that the burner of a blowtorch would enter the hole in the bake-pan freely. The torch was started going, some charcoal placed in the hole in the pan and, in 10 minutes, there was a white-hot fire in the little forge in which the workman easily heated the control rods and also the cold chisels which were "drawn out" on a heavy block of iron used as an anvil. The chisels were then easily hardened and drawn in the little bake-pan forge, which was found to be capable of doing a large amount of work in the garage.

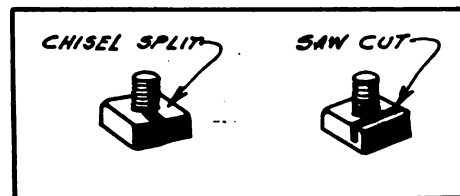
But the earth filling gave a bit of trouble by getting dry and falling into the hole through which the torch burner sent its blast. The workman went to a brook and fetched some clay that he mixed with the earth with which the pan was filled, and the heat of the blast from the torch and from the charcoal soon burned the earth and clay mixture into a fine bit of red brick. Had fire-clay been available the little furnace would have been a permanent makeup.

The garageman told the writer privately

that he surely would have a forge in the shop before another year for the many uses of the bake-pan forge had shown him how important a shop forge and its tools would be in his business.

Loosening "Stuck" Nuts.

When the rusted-fast nut refuses to yield to the hardest wrench pull which can be given without breaking the bolt, then ham-



Two Ways to Loosen "Stuck" Nuts.

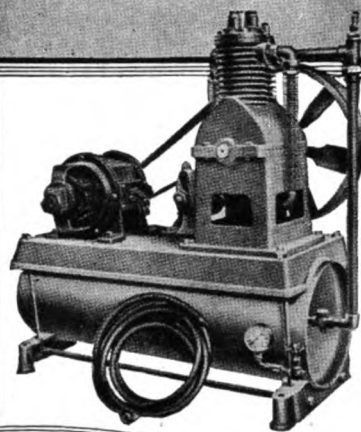
mering the nut is usually tried. If a heavy bit of metal is held hard against the nut opposite to the point where blows are being struck, the nut is often loosened thereby.

Should hammering, kerosene oil and other means fail to start the nut, recourse is often had to cutting the nut with a cold chisel and hammer. The nut may either be entirely cut in two or, by cutting partially through one side, the nut may be stretched so much as to loosen it from the threads so that the wrench will start the nut off.

Frequently, the nut is located upon a washer which bears against wood or soft metal, and the hammer blows against the chisel may drive the nut into the soft substance, thereby making bad work of its surface. The illustration shows the manner in which a nut may be cut open with cold chisel and hammer, and also shows another way of loosening "stuck" nuts without injury to the surface beneath the nut.

With a sharp hacksaw, make a cut through the nut as close to the thread as the saw can be made to run. No matter if the teeth actually scrape against the threads. The saw may be driven clear down to the washer, cutting the nut into two pieces, after which it can probably be screwed off with a wrench without further trouble.

The writer prefers not to saw the nut quite in two. The saw is stopped about $1/32$ -inch from the bottom of the nut and the wrench applied. Nine times out of ten, the nut will start but, if it still sticks fast, a few light blows from a hammer will usually start the rust. Leaving the piece adhering to the nut makes it easier to use the wrench because if the piece be cut entirely off the nut, two wrench-sizes will be needed when the nut is being screwed off after it has been loosened.



CURTIS *Single Stage and Two-Stage* AIR COMPRESSORS

Curtis Single-Stage Compressors—the most popular everywhere. Have controlled splash oiling system—runs ten to fifteen times as long on same amount of oil. Fan flywheel—helps in keeping cylinder cool. Hand unloader—prevents blowing fuses and jumping belt. Head removable without loosening pipe connection. Also many other exclusive features. Several styles and sizes.

Curtis Two-Stage Compressors have same features that established our single-stage so strongly and in addition have all possible advantage of two-stage compression. Exclusive Aeroplane type COPPER intercooler with thin radiating fins rigidly attached assures fullest advantage of two-stage compression. Several styles—two capacities.

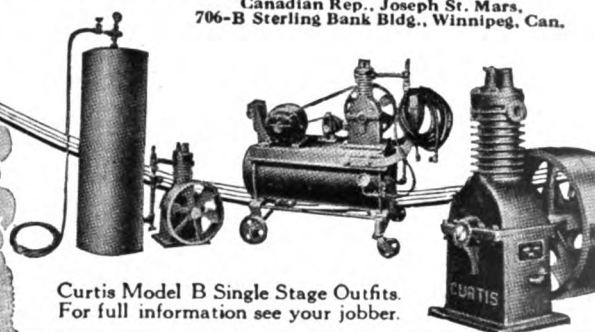
FREE
CURTIS AIR
FREE FROM OIL

This Curtis Sign—14x20 inches—baked enamel on heavy steel. Furnished at small cost to users of Curtis Garage Air Compressors.

Curtis Pneumatic Machinery Co.
1515 Kienlen Ave. St. Louis, Mo.

Branch Office:
530-U Hudson Terminal, New York City

Canadian Rep., Joseph St. Mars,
706-B Sterling Bank Bldg., Winnipeg, Can.



Curtis Model B Single Stage Outfits.
For full information see your jobber.

Flexlume Signs—

*The Best Advertising
At Smallest Cost*

IT costs only a few cents a day to operate a Flexlume Electric Sign. For this you get the best advertising in the world—your name and your sales story in letters of light right there where your goods are sold.

Flexlumes are day signs as well as night signs. They have greatest reading distance, lowest upkeep cost, most artistic designs.

Let us send you a sketch showing a Flexlume to meet the needs of your particular business.

FLEXLUME CORPORATION

25 Kail St.

BUFFALO, N. Y.

Flexlumes—Electric Signs Made Only By The Flexlume Corporation



"Seen and Heard in Garages"

(Concluded from page 42.)

Carburetor Plugged Up.

While the writer was present a car was towed into the garage which the owner had driven from his home, less than a quarter of a mile away, and had gotten close to the garage when the car "went dead." All his wiles and attentions could not make it start again, and a passing friend towed the car in.

The garageman could find nothing wrong with the ignition, and there was a little gasoline in the tank—half a gallon or so—but still the car would not start. Finally the carburetor was removed and examined, being partially disassembled for the purpose, and was found partly filled with a thick, viscid oil which was almost as tenacious as cold molasses. The float-valve was stuck fast. "There's your trouble," said the ga-

rageman. "Where did you get that stuff?"

The car owner was unable to tell where the thick grease came from and the garageman asked where he bought the last lot of gasoline. "Oh!" said the owner, "I ran out of gasoline yesterday as I was coming home. The engine went dead about four miles from here and a hundred yards from a garage. I went in there and got a gallon of gasoline and they gave me a can to fetch it in. I had to walk to the garage.

"What kind of a can did you borrow?" asked the garageman. "It was a rectangular oil can, made to hold about one gallon and they filled it full of gasoline. Said they didn't sell gasoline, but would let me have a gallon of that which they kept for their own cars."

"There you are," said the garageman.

"Probably that can had some thick oil sticking fast inside and some of it came off into the gasoline while you were carrying the can back to the car. That thick oil came over, settled in the carburetor, wouldn't vaporize, and just naturally clogged the float-valve fast. Better look at strange cans before you put anything into them which can get into the gasoline circulation."

The gasoline pipes were blown out with compressed air, then washed with gasoline and blown out again. The carburetor was cleaned out and the car owner had no more trouble. But he is pretty careful since then about using either oil cans or water buckets without first examining their condition.

"Aerial Railway" Interests Many

(Concluded from page 40.)

would be impossible for us to handle our service work efficiently without it. Our repair-room installation includes three lines of parallel track, running practically the entire length of the room.

"The ceiling system is bisected in the center by a section of track extending at right angles. This, together with the connection of the tracks at either end, makes it possible to pick up a car or a heavy part at almost any point on the floor. From there it may be conveyed to any place in the building which is reached by the carrier system. If the track is blocked in one direction, the traveling hoist and its burden can be transferred to one of the other tracks and sent on its way without loss of time.

"During the past few months," Schollenberger went on, "we have been very busy mounting schoolwagon bodies on our Reo truck chasses. These bodies are heavy and hard to handle. They must be fitted to the dash, and it would be almost impossible to do the work properly if we did not have some means of raising and lowering them conveniently and accurately.

This is also true, in a measure, of handling heavy truck bodies where these must be removed from the chassis. It is much easier to pass the chain hoist around such a body and lift it by this means than to summon all the men in the shop to leave their work and give a lift in 'strong arm' fashion.

Where time is money—as is the case in the automobile business—the less interruption to which men are subjected and the greater the ease with which cars and heavy parts can be handled, must necessarily result in profit both to the garageman and to his customers. We have installed many

devices with this end in view but we do not know of any which return us a more constant service, week in and week out, than our overhead carriers.

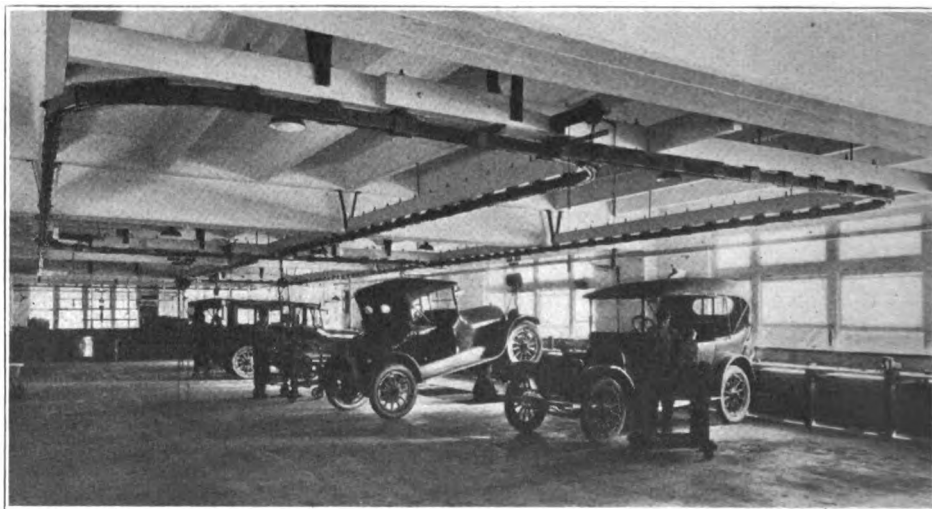
"The installation was made upon a more generous scale than might appear necessary to one unfamiliar with our work but, when it is remembered that we have done away with the use of jacks, it will be evident that in our second-floor repair department in particular it seemed advisable to make it possible to elevate a car for mechanical work at almost any point on our rather extensive floor space."

Would You Pay Twenty Millions for a Motor Car?

No great number of American cars have been sold in Poland since the pre-war period, says Assistant Trade Commissioner

Allport of Warsaw in a report to the automotive division of the Department of Commerce, because of the high prices asked for them. Some of the more expensive makes would sell for about 20 million Polish marks, delivered—a sum which only four or five people in Poland could afford.

American cars are in favor with people, however, and would be given preference over European makes if prices were equalized with the latter. Some Austrian and German cars have been sold; but French, English, and American cars are inaccessible to the majority of the people under the existing low exchange value of the Polish mark. Second-hand American cars are being offered by relief organizations at low prices, but the cars are in such poor condition after hard service that they present little or no competition to the new cars.

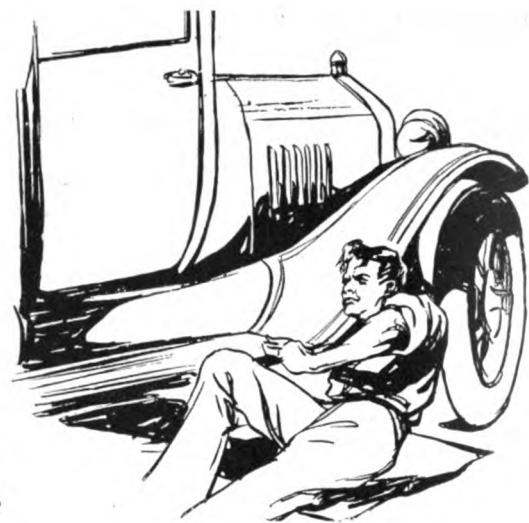
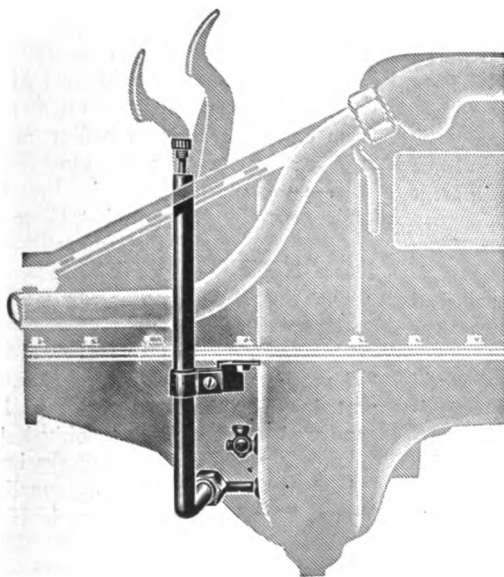


Overhead Carriers Also Serve for Elevating Cars for Underneath Repairwork.

**When a Ford
Has Just Enough Oil
When the Oil
is at the Right Level
When Level is Approach-
ing the Danger Mark**

The
**SCHAEFER
OIL
WATCH
TELLS**

No more crawling under the car. Oilwatch is adjusted from driver's seat. Driver just lifts rod out with an easy movement and looks at its lower end. High, low and middle levels indicated by three raised marks and oil on rod shows where it stands and its exact condition. An easy push replaces rod so it cannot rattle or work loose. It takes just five minutes to install the Oilwatch.



**The Old
Way
and
The
New**



Ford dealers are selling two Oilwatches a day—easily and at a fine profit. Every Ford owner is a prospect for this safety device, as it is an assurance against burned out bearings, it's a reducer of expenses, an eliminator of trouble, and a preserver of clean clothes. Tell your customers about Oilwatch. It retails for only \$2.50. Carry Oilwatches in stock so you can meet the demand.

Mail This Coupon Today

Philip Schaefer & Company
20 E. Jackson Blvd., Chicago, Ill.

Please send me your dealer proposition:

Name

Address

Jobber

Finding Profits in Your Storeroom

(Concluded from page 28)

from the store room. The triplicate goes to the storeroom, where the carbon copy of the form Fig. 18 can be pinned to it. The cycle of this order is now complete and is awaiting the arrival of the material.

Another very common problem in handling stock is the receiving of shipments. Too often improper control of material when received is the cause of inaccurate inventory records. Also, when no record is made of material received other than by verbal mention, considerable difficulties are met in the office when trying to pay off invoices in time to save discounts.

Often the delivery is made and for several days it is not noticed, delaying the approval of the invoice as well as the use of the shipment. For every item of stores or supplies that is received by the stores clerk—assuming that all incoming materials go through the storeroom—a material-and-supplies-received form is made out.

Gasolene delivery, oil delivery, and parts delivery are all entered on this form and turned into the office. The perpetual inventory can then receive the entry of material received and the invoice issued for payment.

It is much more convenient for the office to know when shipments are received by the receiver's ticket being delivered to the office.



Fig. 21. Good Place for Printed Forms.

This eliminates running out to the shop or storeroom to make a search for material delivered. When unpacking goods, a shortage often occurs. Many times this is caused by careless unpacking.

To impress upon the storeroom clerk the importance of careful unpacking and checking of the shipment, instructions as shown at the bottom of this form are given. Having these printed instructions on every sheet keeps before the clerk at all times the importance of exercising care when unpacking shipments. This form is made out in duplicate, the original going to the office and the duplicate being held in the storeroom. These are then attached to the pur-

chase orders thus completing the cycle.

The stores clerk should be provided with a convenient desk or counter, where all entries can be made on the forms and his necessary paper work be carried on. A combination storage desk similar to that illustrated in Figs. 20 and 21 is the one most commonly used in the storeroom. Notice the two books lying on the desk. One of these is a book in which all shop needs are listed and the other is for automobile accessories needed.

These "want" books play an important part in the ordering of such items. A reference to the "want" books eliminates the danger of forgetting to order something that is needed. Forms used can be stored in the desk as shown in Fig. 21. A shelf can be provided for catalogs and trade papers where they will be in easy reach when working at the desk and is a convenience that will be found helpful.

Stores represent cash and the same influence of accurate accounting should surround them both. Proper control should eliminate loss by theft or careless accounting methods. The storeroom is one of the most important branches of a business and methods that will help to control it effectively are always acceptable and are, of course, in demand.

Welding, Cutting and Brazing Practice

(Concluded from page 36)

contraction of the rim which is also permitted to cool at the same time.

This rule may be applied to the welding of most automobile work, but it involves too much fine measuring for the average welder. However, as in all things, there is some latitude both ways. That is to say, if the fracture to be welded is widened a distance anywhere between 0.01 and 1/32-inch, it may be welded with safety.

It is practically the same with other automobile castings. Take, for instance, a four-cylinder block with the fracture located on the shoulder of one or more cylinders. Here the crack is situated in such a place that the resistance to the pull of weld contraction is absolute. The shape of the casting is such that it cannot give any when this pull commences.

The only recourse is to heat the whole job all-over—in other words, to expand the whole casting, and then arrange to have the whole thing cool and contract in harmony with the shrinking weld. As the weld shrinks, the casting shrinkage follows the action inward and thus prevents it from re-cracking.

On the other hand, take a broken lug, or a support arm on a crankcase casting. In

this the weld contraction is free to act. It can move or draw the broken lug inward without resistance or, if the part is not broken entirely off by the expansion of the weld, can push the part outward when the intense heat of the welding flame expands the weld. The contracting weld then draws back the broken part just as readily.

Sometimes it is difficult for the beginner to judge exactly whether or not the weld expansion and contraction are free to act without meeting resistance, on account of the shape of the job. But he can soon learn to tell if he watches the effect on different jobs.

Other complications will appear from time to time but, as a whole, the theory is that the weld contraction is the principal factor in determining how to heat or expand a job. If the beginner will pay more attention to the weld contraction, he will soon learn to figure the actions out in advance. In short, he should watch the casting expansion and the weld contraction more than the expansion and contraction of the weld.

Of course, there is the danger of other parts of the casting cracking due to unequal heating and cooling in the preheating

process through the heavy parts drawing away from the lighter sections, but this is scarcely ever troublesome after the welder learns to make a scientific matter of the expanding process.

German Competition Not Serious in the Netherlands.

Consul-General Anderson, Rotterdam, Netherlands, states that, in spite of the increased imports of automotive products from Germany during the first quarter of 1922, as compared to the same period in 1921, automobile agents in the Netherlands generally indicate that German cars are not popular and that competition in the future is not likely to be serious.

The United States was also able to recover some of its export trade with the Netherlands. Germany supplied 388 of the 652 passenger cars valued at \$807,092 imported during the first quarter of 1922, as compared to the 148 furnished by the United States. Of the 302 trucks imported, valued at \$230,010, Germany supplied 289, France 9, and other countries 4. However, the United States furnished 100 of the 145 truck chassis imported, as compared to 30 supplied by Germany.

Why a Brunner Costs Less

than any other air compressor a dealer can buy.

IN every single respect, it is superior.

It is more efficient—more economical—more powerful in action. It pumps more air—to the kilowatt hour, under all conditions, over any period of time.

It lasts far longer—in perfect condition. And when it does need attention—after 5 years or so—adjustments are quickly made, and your Brunner is as good as new.

We have been making Brunners for only 20 years. So we don't know just *how* long one will last. None, so far, has ever worn out. The first Brunner we made is still in operation, doing perfect work.

And if you want to know *why* these things are so—ASK AN ENGINEER. *He* knows the meaning of ground contact surfaces, half-a-thousandth tolerances, "running in" with oil, and jigs, fixtures and gages some of which cost thousands of dollars each—he knows what a tremendous difference these things make in the life and efficiency of any machine.

And that "difference" goes right through to the pocket of the garageman.

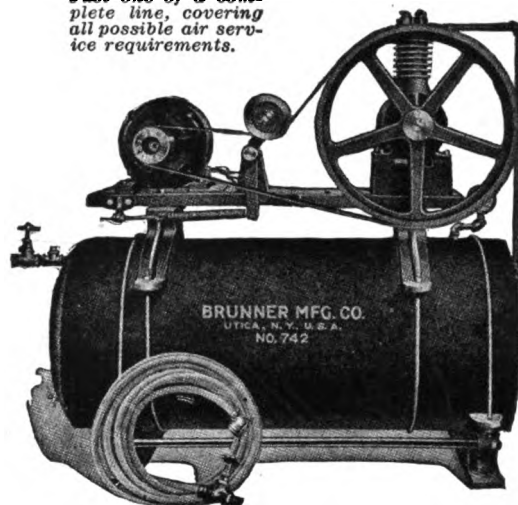
The plant where Brunners are made is a Show Place in Utica. Everything that modern manufacturing practice and the highest ideals of mechanical excellence require is there.

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Oldest and Largest Manufacturers of Air Compressors in the World
UTICA, NEW YORK

*Sales Offices: Utica, Cincinnati, Kansas City, San Francisco
and almost every Jobber from Maine to California*

Just one of a complete line, covering all possible air service requirements.



QUANTITY *production permits pricing Brunner Quality Compressors at same figures as any ordinary compressor of similar capacity.*

Valuable Book Free

A very interesting 24-page book on The Principles and Methods of Air Compression will be mailed to you upon request.

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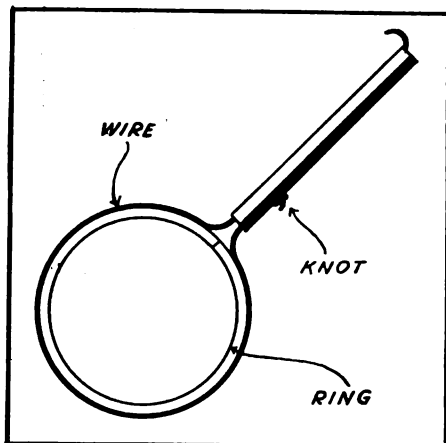
BRUNNER

AIR COMPRESSORS

Practical Hints for Shop Mechanics

Simple Piston-Ring Compressor.

A simple piston-ring compressor may easily be made from a short length of $\frac{1}{8}$ -inch pipe and some small insulated wire. A small hole is drilled through one side of



Easily Made Piston-Ring Compressor.

the pipe, a short distance from one end.

One end of the wire is passed in from the end of the pipe, out through the hole, and knotted on the outside of the pipe. A loop is made in the wire and its other end passed through the pipe.

The ring is compressed by placing the loop about it and drawing the wire through the pipe.—B. I., Ind.

Quickly Made Tool Holder.

All are familiar with the pen racks made from a small coil spring. A similar rack can be made from a large spring, firmly stapled to the wall, that will serve admirably for holding tools.

When pressed in between the coils, the tools are firmly gripped. This is much quicker and handier than hanging them up.

Lining Up Gaskets.

Cylinder heads are held to the block with either cap-screws or studs. If cap-screws are used, it is difficult to line up the head, gasket and block so that the screw may be started. If the gasket is a little out of line and the screw forced, the gasket may be damaged and the same trouble encountered when putting in the remainder of the screws.

It is a good plan to make up two sets of alignment studs for the sizes of cap-screws usually found in cylinder heads. A set of these will consist of two, and may be made by sawing off the head of a regular cap-screw and slotting

that end for the insertion of a screwdriver.

Insert one each of these in diagonally opposite corners of the block, drop on the gasket and slip on the cylinder head. Start the remaining cap-screws before removing the alignment studs. Things will work much smoother if this kink is used.—L. R. B., Iowa.

Removing Ford Cylinder Head.

To prevent the two rear cylinder-head bolts of the Ford from catching in the gasket while removing or replacing the head, I lift the bolts and wrap a little tape around the bolt below the head after I have unscrewed it.—O. H. S., Minn.

Humming Noise in Ford Motor.

When the Ford motor has to be overhauled it is necessary that the timing gears be replaced with new ones. In most cars that have been running something like two or three years on the same cylinder block, the crankshaft wears the bearings up slightly, thus causing the new gears, when installed, to go too deeply into the mesh. The teeth bear against the opposite gear, causing in most cases a loud humming which is sometimes hard to account for.

This may easily be overcome by taking a coarse file and filing the teeth on the camshaft gear off slightly when the motor block is yet unassembled, with the bearings all in and the motor running or limbering up before assembling all parts.

This has been very beneficial in my shop, and also does away with a lot of explaining the noise to the customer before he will accept the job.—D. & F., Mo.

A Drop Light That Stays Put.

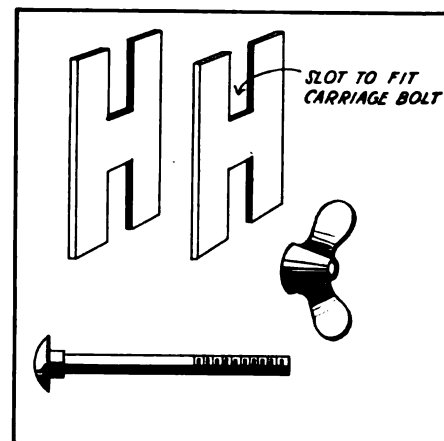
When taking up the bearings and working in dark corners about the car, the regular drop light is a bit large and often cannot be held to light the exact spot wanted. For an addition to the regular drop light, a small dash lamp—such as is used as regular equipment on most cars—

is easily attached as well as very convenient.

Screw this onto a large clothespin and you have a trouble light that will go into all the odd corners and attach to any bolt or projection that is near by. The hood of the lamp may be adjusted to reflect the light—not in your eyes but on the work.—L. R., Ill.

Device for Holding Brake Lining.

We made a device to hold brake lining while riveting it on the band, by cutting a slot in each end of two pieces of soft steel



Holds Brake Lining While Riveting on Band.

$3\frac{1}{2}$ inches long, $\frac{3}{4}$ -inch wide and $\frac{1}{4}$ -inch thick, and using two carriage bolts $5/16$ -inch by $1\frac{1}{2}$ inches, with two $3/16$ -inch wing nuts to tighten the clamps when placed over the band and lining.

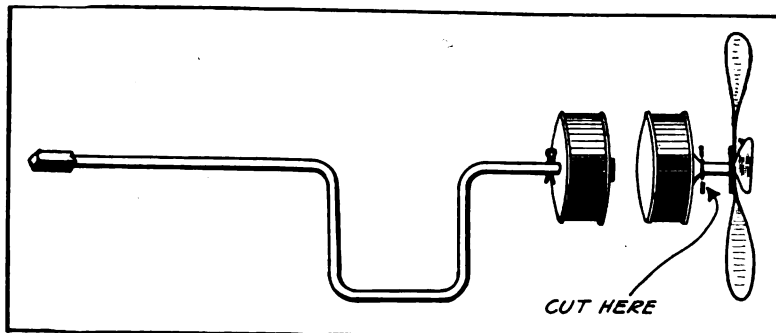
The bolts can be used to hold the lining square with the band by sliding them in against the band and lining and tightening them in that position. This holds the lining while being drilled, also.—O. B. R., W. Va.

Speed-Wrench Handle Repair.

Frequently the revolving handles on speed wrenches either break or come off. We find that one of the easiest as well as the most lasting repairs can be made as follows:

Select an old Ford fan hub from the junk pile and, with a hacksaw, cut the pulley off from the hub. Put this on the wrench shank for a handle and, just below the pulley, drill a hole for a stiff cotterpin.

Bore a slight counter-sink in the brass bushing in the old pulley, rivet a small washer on the end of the wrench shank to keep the pulley from coming off and job is done.—A. L., N. J.



One of Easiest and Most Lasting Speed-Wrench Handle Repairs.



Draw Business from Down the Street---Now

That is the only way you can get a big share of it—NOW. You must keep everlastingly asking the public to trade with you.

12 Months to Pay

A small payment brings you the sign. It pays for itself, while you pay for the sign.

Send coupon for full information and prices as well as sketch showing how your Federal Electric Sign will look. Do it now—no obligation—gain a step on competition.

And, the most forceful, economical way to advertise your business and location to the hundreds of people who pass your garage, is to use a federal Electric Sign, such as shown above.

The sign shown above is made of raised snow white glass letters and the bulbs are behind each letter. Beautiful blue and white Porcelain Enameled Steel background. Never needs painting—stays permanently bright and attractive. Easily read from a distance. Costs only a few cents a day for electricity.

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Federal Electric Company,
8700 So. State St., Chicago, Illinois.

Please send me full information, price and free sketch of Federal Porcelain Silveray Sign for my business. Explain your 12 Month to Pay Plan. No obligation.

Name..... City..... State.....

Street and No..... Business.....

Store Frontage..... No. of Floors.....

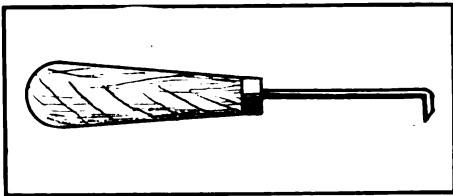
(AGAD-6)

Federal Electric Signs are the cause of a busy street—not the result.

Brush Lifter.

In removing starter and generator brushes it is necessary to lift the spring-brush holder off the brush or hold it up while removing the retaining screw. The little tool here described greatly facilitates this operation.

A "square bend" screw hook is screwed



Screw Hook Screwed Into Suitable Handle.

into a suitable handle and ground into the shape shown in the sketch. This small hook will lift the brush on most starters and generators and is a great time-saver.—J. & R., Mich.

* * *

Screws in Inaccessible Places.

It is sometimes necessary to start small screws in almost inaccessible places. Usually the screws are tightened readily enough with a screwdriver, but in a position that will not admit the mechanic's hand.

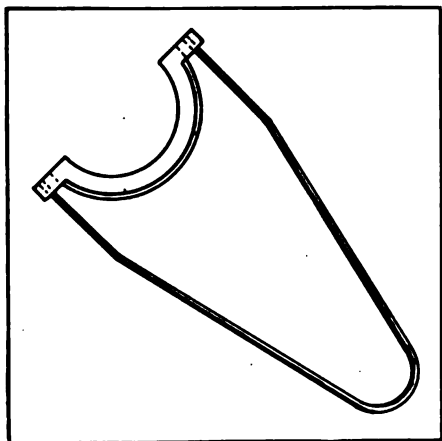
A small piece of round rod and a couple of pieces of small clock spring will solve the difficulty in most cases. The rod is slotted for a short distance back from one end and the pieces of spring inserted in the slot. Even up the outer ends of the springs and spread them so they will tend to pull apart.

By pinching the ends together and inserting in the screw slot, the screw will be securely held until it is given the initial starting turn.—L. R. B., Iowa.

* * *

Tongs for Bearing Caps.

The shop that rebabbitts bearings will find that a hot bearing cap is inconvenient to handle. Tools are often ruined by handling



Convenient When Handling Bearing Caps.

these hot pieces while doing repairwork.

The tongs shown in the illustration will prove very convenient when handling bearing caps. They are made from a length of ordinary round mild steel, and are shaped

so that the ends will have to be pressed together before they will enter the bolt holes of the cap.

The spring of the tongs will hold the cap on the tongs.—S. J. R., Tenn.

* * *

Radius-Rod Bending Iron.

The Ford radius rod very often gets bent. This sets the lower side of the front axle too far to the rear, thus throwing the wheels out of line and making the car hard to steer.

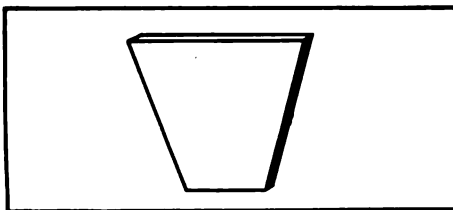
Not wishing to spend several dollars for a tool to straighten these with, we had a local blacksmith bend a hook on the end of an old driveshaft. This hook will just fit the axle and, by lifting up on the free end of the bar, it is very easy to bend the rods back to their original shape.—D. & F., Mo.

* * *

For Tightening Taper Hubs.

Hub shims, for tightening taper hubs on the axle, are easily and cheaply made from sheet iron by using an old hub and a short piece of shaft as a die for forming them. A piece of tin is cut in the shape shown in the illustration and roughly bent around the taper of the shaft.

Insert the shaft and shim in the old hub



For Tightening Taper Hubs on Axle.

and strike the end of the shaft with the hammer. This forms the shims to the desired shape.—D. M., Mont.

* * *

Fuller's Earth Gun.

We have found a much easier method of applying Fuller's earth to a clutch face than working it in with a putty knife.

Simply fill a "powder gun," such as insect powder is distributed with, and shoot the powdered earth between the clutch face and the flywheel. This is a great time-saver.—J. L., Ind.

* * *

Drilling Out Radius-Rods Studs.

It has always been a disagreeable job to drill the stud bolts out of the bottom of a Ford crankcase when they twist off until we hit upon the following plan:

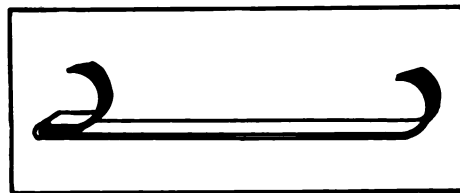
The front of the car is lifted with the hoist high enough to set the breast drill on the floor with the drill bit against the stud.

Put the drill in low speed, and one person can turn it while another lowers the hoist very slowly. Thus the weight of the engine feeds the drill and does away with the tiresome job of pushing the drill against the work.—H. W., Mont.

Ford Cylinder-Head Bolt Holder.

On page 37 of the January issue of the AMERICAN GARAGE & AUTO DEALER, I noticed a Ford cylinder-head bolt holder. I have one to give you and, if you think it worth while to give it notice, you may pass it along to the boys.

I use a piece of tin, or a piece of zinc



Home-made Cylinder-Head Bolt Holder.

from some discarded dry-cell battery. The strip of metal should be about $\frac{1}{4}$ inch wide and made as shown in the illustration.—W. L. H., Kans.

* * *

Tire Spreaders.

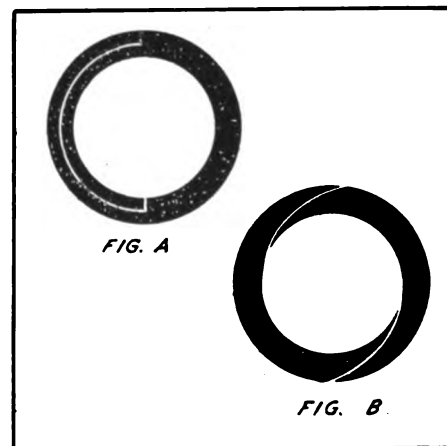
In working on casings, it is necessary for the beads to be spread apart and held in this position. As the average shop has but one mechanical spreader, the following method may be used to advantage:

Cut a $\frac{1}{4}$ -inch iron rod into 5-inch lengths and grind the ends to a sharp point. Spread the beads apart and insert one of these rods on each side of the break. The sharp ends prevent slipping and hold the tire open.—M. R. T., Wash.

* * *

Fitting Radiator Hose.

The outlets and inlets to some radiators and engines are of such a size that it is almost impossible to expand the hose enough to make the connection. There are two solutions to such a problem. Fig. A shows the end view of a hose that is cut half way around. Fig. B shows a similar view of a piece of hose that has two slant-



Two Ways to Expand Radiator Hose.

wise cuts, each extending about one-fourth the distance about the piece of hose.

Using either method, the hose will slip on easily and the hose clamp will tighten the joint so that there is no danger of leakage.—R. I., Wis.



NEPTUNE

The Pure Distilled Water For STORAGE BATTERIES

Why Dealers Can Realize Attractive Profit by Stocking Neptune Distilled Water:—Did you know that all battery guarantee is subject to the use of distilled water. Motorists have need of distilled water at least twice a month; so have you, Mr. Garageman, for the cars in your garage. Make it an added bit of service.

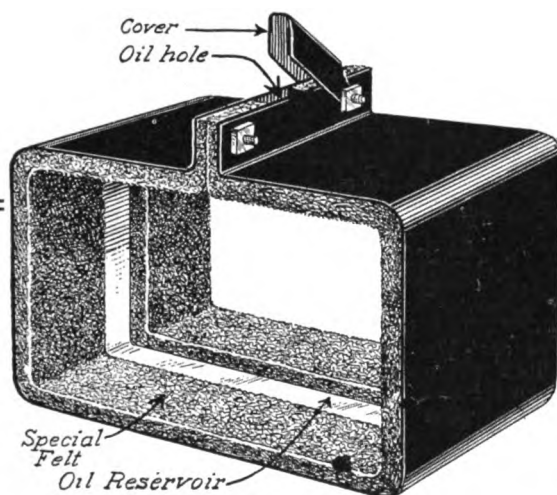
Neptune Distilled Water is pure—free from mineral or organic matter in suspension or solution. It means Long Life to Batteries. Neptune Distilled Water can be purchased in 5 gallon Carboys and 50 gallon barrels for your own use. Send in your order today.

Small Investment—BUT—Substantial Profit. Who is a more logical dealer in distilled water for storage batteries than the garage owner and accessory dealer? When a motorist buys his lubricants and accessories, sell him his battery maintenance requirements as well. Cost to dealer \$2.50 for case of 12 half-gallon bottles; retails at \$3.60. The bottle and case have a value of \$1.70 (50 cents for case and 10 cents a bottle) anywhere in the U. S.; we will refund this amount if returned to us. All prices F.O.B. Chicago. Send money or check with order.

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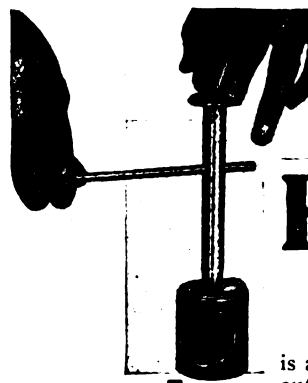
Automatically lubricate, stop the squeaking, protect the springs and eliminate rust. Just clip on spring, fasten with screws and apply oil. Then—smooth and quiet riding “forever”!

Ford Cars
Complete set of four oilers
\$2.00 prepaid

All other cars
Complete set of eight oilers
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BOX 25
COMPTON SPRING OILER CO.
29 Broadway, New York, N. Y.

DEALERS—Mention name of Jobber.



Reseating

Cutting through heat-scaled valve seats with the pressure of two fingers—

is a simple matter with this shear cutter reseater. Five cutters taking $1\frac{1}{8}$ " to $3\frac{1}{8}$ " valve seats, and four accurate pilots (with spindle and handle) are in the

SKINNER MOTOR VALVE SET

Which also includes our new filing refacer. This refacer with its accurate guide bearing—its special hard file held to a true plane by two rollers—puts a true seating surface on even a warped tungsten valve head—with startling speed.

When valve seats are reseated and valves are refaced, the “grinding” of valves is reduced to an absolute minimum. Write for our illustrated treatise on valve work—free for the asking.

M. B. SKINNER CO.
562 Washington Boulevard, Chicago

Grinder
accuracy
at a
hand-tool
price

Readers' Questions and Answers

Gasolene Engine Exhaust Pipes.

I get very good information from your paper. One issue is worth the total price. Will you tell me in your next issue why some gasolene engines have two exhaust pipes or one at each end of the cylinder. I have one this way and cannot understand it. This engine has the inlet valve and exhaust valve besides the two pipes. Some engines don't have any valve caps when two pipes are used. This engine is a four-cycle.—G. M. S., Kans.

As you do not mention the make of engine or give a detailed description of the device, it is possible we do not understand just the construction to which you refer.

Many engines are "ported" or have an opening in the cylinder wall just above the position of the piston head on bottom center. On the exhaust stroke, much of the hot gases are claimed to escape through this opening and result in a cooler engine and better scavenging.

* * *

Grind in Ford Motor.

I would like some information. I have a Ford which had the oil drain dented in but not enough to make the magnets stick. I took the motor out of the car and, after putting it back, a grind developed.

When it was in high speed, if I rested my foot on the low-speed lever, it would stop. The sound was a humming grind. There were no marks to show where anything had been rubbing. Everything seemed to be O.K. except for the noise. Could a sprung crankcase cause this noise and, if so, why only on high? It did not make any noise on any other gear.

When we put the engine together, every bolt-hole fitted perfectly. If you could give me some light on this, I would appreciate it very much.—R. L., N. D.

Another answer to this question, which was also published in our December and January issues, is given by a Michigan subscriber as follows:

"I saw a query in regard to a grind in a Ford motor from R. L., N. D., and, as I have had the same trouble in a Ford motor which I built up in my shop, I will tell what caused the trouble in my motor. R. L. says that he straightened out a jam in the crankcase, while I used a welded case when I assembled this motor and I had the same symptoms as R. L. mentions.

As the grind did not get any worse and, in fact, disappeared in a short time I did not disassemble the motor for several weeks, but when I did I took particular pains to look the motor over very carefully. The trouble was that the case had sprung in welding and the bearing on the rear end of the transmission, where the universal joint attaches, was cut out on one side so this was what caused the grinding noise.

When I put my foot on the low pedals the grinding was not so pronounced, just

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your business, the more you will know—and the more you know, the more money you will make.

Whether you are a dealer, a salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

as R. L. states he found, and I would assume that when he hammered out the jam in his case he threw this bearing out of alignment."

* * *

Valve Timing 1918 Chandler.

Would you kindly mail me at once the valve timing for a 1918 Chandler? There is only one center punch mark on the flywheel. The valve timing chain has been broken.—W. E. B., Cal.

The firing order of the cylinders is 1-5-3-6-2 and 4.

The inlet valves are No. 2-4-6-8-10 and 12.

The exhaust valves are No. 1-3-5-7-9 and 11, counting from the front of the motor.

The exhaust valves are timed to close 1½ inches past dead center on the suction stroke.

The inlet valves are timed to open 1½ inches past dead center on the same stroke.

Top dead center on the compression stroke may be determined by turning the flywheel until the mark on the flywheel comes opposite the marks on the case. Removal of the large pipe plug in the top of the flywheel housing underneath the upper

floor board will enable one to find the marks without any difficulty. When the marks on the flywheel and case are opposite one another, No. 1 piston is at top dead center.

With the valves closed, the clearance between the valve plungers and valve stems should be 0.004 of an inch, with the motor hot.

To check the setting of the camshaft, remove the front cover over the chain compartment, exposing the timing sprockets and chains; with the camshaft in proper relation to the crankshaft, the punch marks on both sprockets will line up with the sprocket centers, the two punch marks being on the edges of the sprockets nearest one another.

The timing of the magneto may be checked by bringing No. 1 piston to top dead center on the compression stroke. Retard the spark lever to its farthest point; remove the distributor head, together with cover, from the breaker box. The distributor brush should be directly opposite the contact point of No. 1 cylinder and the contact points in the breaker box just opening.

Should the position of either need to be changed, loosen the locknut which holds the magneto coupling, then loosen the magneto coupling—which is a tapered fit on the magneto shaft—by striking it a sharp quick blow sufficient to loosen the magneto shaft, then the location of the distributor brush and contact points can be changed very easily. The coupling should now be tightened.

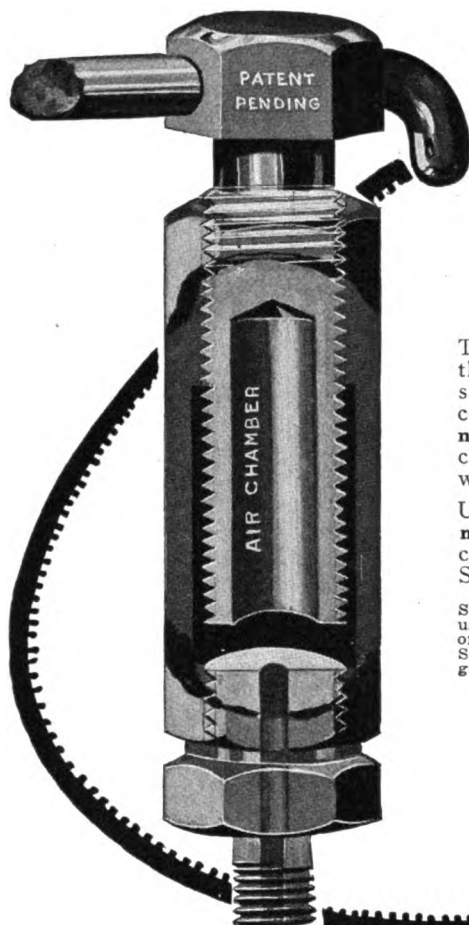
The timing chains should be adjusted as follows:

Remove the hood from car. Remove the cotter pin in radiator tie-rod clevis pin. Remove the radiator hose by loosening the hose clamp bolts. Remove the two nuts from the radiator studs where they extend through the front across member of the frame. Remove the radiator. Remove the pin from the front end of the crankshaft. Remove the stud nuts which hold the chain cover to the crankcase.

The position of the sprockets should be noted before the chains are removed to keep the motor properly timed. The cork gasket and felt around the inside of the crankshaft hole should be examined before the chain cover is replaced and if at all damaged, and new gasket and felt should be newly installed to avoid oil leaks.

The magneto chain is equipped with an offset link at the factory for this purpose. To remove this offset link and shorten the chain, remove the cotter pin and the plain washer which hold the master pin. Remove the two small bushings which hold the link and remove the chain.

To remove the offset link from the chain proper, cut the end of the pin and remove



It's a Winner

THE STRICKLER HIGH PRESSURE GREASE AND OIL GUN

**MAKES GOOD
BECAUSE IT'S MADE RIGHT**

The Strickler wins where others fail for the reason that it can't burst through back pressure. Look at the illustration of the Strickler and see why. This High Pressure grease and oil gun is made of solid, cold rolled steel, machined out and threaded from the bar stock. It's **not** cast. The pitch of threads gives positive, steady feed, and air chamber acts as cushion to steadily compress the grease and force it, without strain, where it belongs.

Under pressure of the Strickler, dust, dirt, corrosion and hard grease **must** go. Used everywhere as an auxiliary to lubricating systems costing great deal more. Price of gun \$3.50. Extra nozzles 80 cents. Specify name, date and model of car.

Series of special male and female nozzles make it possible to use Strickler High Pressure guns on any car. Manufacturers of Franklin, Pierce Arrow, and many others use and recommend Strickler High Pressure grease and oil guns. Special sets for garages, for use wherever grease cups are used, \$18.00 with gun.

Get complete particulars at once.

ADKINS, YOUNG & ALLEN CO.

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For Results--

The Buffum Buick Valve Remover Is Unexcelled

It makes valve cleaning *easy*! Saves time too, and it is conveniently handled.

The Buffum Buick Valve Remover affords a protection to the customer against breaking of valve seats, springs, or washers, so often caused through the clumsy handling of a crowbar in removing valves.

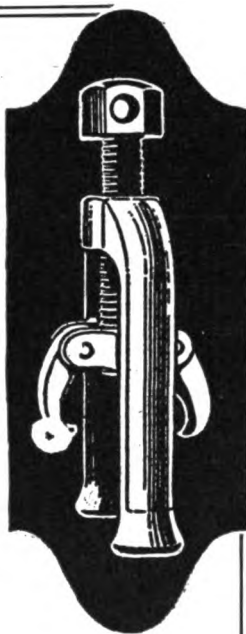
As Buick valves should be cleaned at least every 5,000 miles, this tool is a necessity to the Buick owner. And it's mighty handy when he has trouble on the road and finds difficulty in locating it.

Retail price of the Buffum Buick Valve Remover is \$2.00. The tool is fully guaranteed.

BUFFUM TOOL CO.

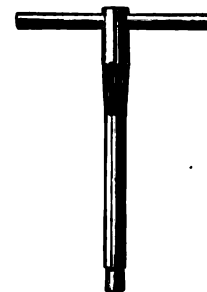
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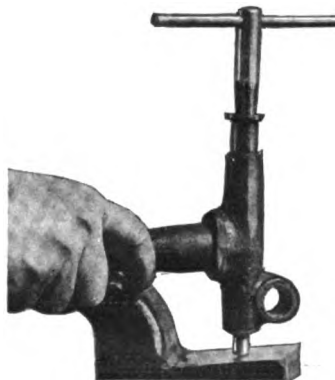
THE HOLLY BUSHING EXTRACTOR Goes In and Gets 'em

no matter how tight or in how difficult a place a bushing may be. Extracts sizes ranging from $\frac{3}{8}$ " to $2\frac{5}{16}$ " inclusive. Used and recommended by Ford Motor Co., Dodge Bros., and Chevrolet Motor Co.



Style of tools Nos. 0, 1, 2, 3 and 4

Tools may be had singly or in sets.



No. 1 Holly Extracting Ford Spindle Body Bushing

Standard set (Nos. 0, 1, 2, 3, 4 and 34B tools)\$18.40

Combination set (No. 579 tool extracts bushings from $1\frac{1}{16}$ to $2\frac{5}{16}$ " inclusive)\$10.00

Special Ford Set (Nos. 1, 2, 3, 4 and 79 tools, extracts all bushings in Ford cars and trucks)\$20.00

The Rosier-Howard Corporation

307 National

Hutchinson Kansas

the pin which connects it to the chain. Place the chain in position on the sprockets and couple together. This operation will shorten the chain $\frac{3}{8}$ -inch. The camshaft and generator chain is not equipped with offset links—these may be secured from a dealer or from the factory.

To adjust the camshaft or generator chain, open the chain by removing the master pin, as described in the magneto chain adjustment. Then remove a full link by cutting the end of the pin—this will shorten the chain one full link. Now install one hold link in its place and set the chain in position over the sprockets and lock with the master pin and bushing. Do not forget your plain washer and cotter key at the end of the master pin.

* * *

Sleeve Valve Timing.

Please advise by mail as soon as possible the correct way to set the timing on a Willys Knight motor 1920 model sleeve valve.

The chain has broken and I am going to install new chains. The timing of the camshaft and crankshaft sprockets are not marked.

I will thank you very much for this information.—W. I. V., Ark.

The firing order of the motor is the same as that of any four-cylinder motor; that is, No. 1 cylinder, No. 3, No. 4, No. 2 and again No. 1.

The opening and closing of the valve ports with respect to the position of the pistons is determined by the movement of the ports past the lower edge of the junk ring in the cylinder head. Taking up the cycle of operation on the intake or suction stroke in the No. 1 cylinder, the action is as follows:

When the piston is on top center, the intake port in the inner sleeve is in line with the port in the cylinder block. The port in the outer sleeve, however, just starts to uncover the opening in the cylinder block as the piston starts downward and as the

1-4

mark on the flywheel — is in line with the

1-0

indicating mark on the end of the cylinder block.

The two ports continue to register until the piston has reached and passed its lower

1-4

center, or until the mark — registers with

1-C

the punch mark on the end of the cylinder block. At this instant the lower edge of the intake port in the inner sleeve passes under the lower edge of the junk ring in the cylinder head and closes the intake passage.

The inner sleeve continues its upper direction of travel through the compression or second stroke of the motor until, when the piston reaches top center, it is highest in the point of its travel.

At this instant the explosion occurs in the cylinder, the piston is driven down by this force and, at the same time, the inner

sleeve starts to travel downward. As the piston reaches the bottom center the exhaust port in the inner sleeve and the exhaust port in the outer sleeve register with the opening in the cylinder block to the exhaust

Now It's Your Turn.

In answering these queries concerning the difficulties arising in garage work, we have given the generally approved methods.

But we realize that many of our readers will have a different way of "doing the trick," and can offer interesting and helpful suggestions from a different angle. So we would like to have you tell us whenever you have a different method for handling these various questions.

Let's make this a Round Table for the exchange of ideas and thus be mutually helpful!

manifold and remain open until the piston has completed its upward stroke, so forcing the exhaust or burned gases into the exhaust pipe.

From this explanation it will be seen that the sleeve timing must be checked by determining the relative position of the sleeves and the ports in the cylinder block.

As the sleeves themselves are driven from a single eccentric shaft, there is no possibility of their relative position being disturbed.

To check the timing of the sleeves, remove the exhaust manifold to expose the exhaust ports in the cylinders and introduce a small electric light through the spark-plug hole of cylinder No. 1. Then turn the

block, with the ports closing. At this position, the exhaust port closes and the mark 1-4

— on the flywheel should so indicate this E-C

action by registering with the guide mark on the cylinder block. This method of checking the timing need only be resorted to when the eccentric shaft sprocket or drive chain has been removed.

To assemble the sprockets on the crankshaft and eccentric shaft, and replace the chain in the proper position, turn the crank-

1-4

shaft until the mark — registers with

T-C

the guide mark on the cylinder block, then turn the eccentric shaft over until the arrow A, shown in the illustration, is in line with the arrow C on the edge of the chain housing. Now place the chain on the sprockets so that when it is drawn up tight the arrow B on the eccentric shaft sprocket will be in line with the arrow A on the hub and push the sprocket into place.

When checking timing of either sleeves or spark always turn the crankshaft in the direction of regular rotation.

Assemble the generator drive chain with the crankshaft in the same position. See that the generator drive shaft is so turned that the points in the breaker box of the timer unit are just starting to separate with the spark control lever on the steering column fully retarded or pushed down as far as it will go, and with the distributor finger in line with the spark-plug wire terminal which leads to the No. 1 cylinder.

* * *

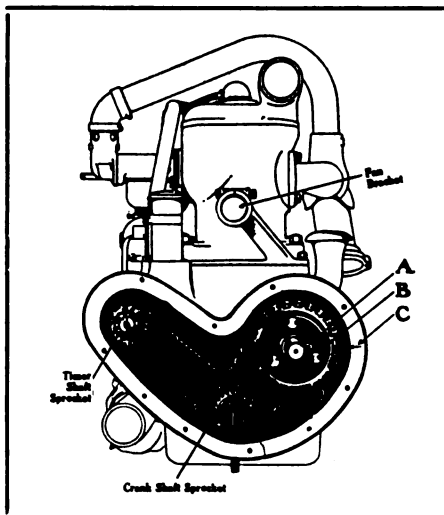
Knock Caused by End Play.

I must again call upon you to help me out in overhauling an Oakland 34-C 1920 model. I have taken up the bearings—that is, the main bearings—and there is still a dull knock. It is not very loud but it is there all the same.

I have taken down the oil pan and find that all bearings are tight but find that there is about $\frac{1}{64}$ -inch play in some of the wrist pins. Do you think this would be the fault? If so, what must be done, as it looks to me like there is no bushing in the piston. The pistons are aluminum. Must the piston be renewed or should I get new wrist pins?—G. W. W., Pa.

The dull knock is probably caused by end play in the crankshaft or camshaft. New camshaft bearings would be required to correct the camshaft trouble and a new bearing cap to correct the end play in the crankshaft. Sometimes end play in bearings is removed by building up the ends of the bearings with solder and then scraping them to a snug fit.

There should not be over 0.003-inch piston pin clearance in your motor. New oversized piston pins should be secured and fitted carefully with an expansion reamer. Before fitting pins, you should make sure the pistons fit properly. They should not have more than 0.006-inch clearance.



Method of Assembling Sprockets on Crankshaft and Eccentric Shaft and Replacing Chain.

crankshaft slowly until, with the exhaust ports closing, a narrow pencil of light is barely discernible between the upper edge of the port in the outer sleeve and the lower edge of the exhaust port in the cylinder

RESULTS OBTAINED SURPASS YOUR EXPECTATION

TURNER MASTER LINE BLOW TORCHES



Produce more heat on either gasoline or kerosene and without clogging.

The satisfaction to users, dealers and jobbers accounts for the ever increasing sale.

The one opening in the tank (eliminating leaks from soldered connections), pistol grip handle, safety valve, air release and baffle in the burner are points of improvement that cannot be duplicated as they are patented.

Cost less than ordinary torches.

Catalog on request.

THE TURNER BRASS WORKS

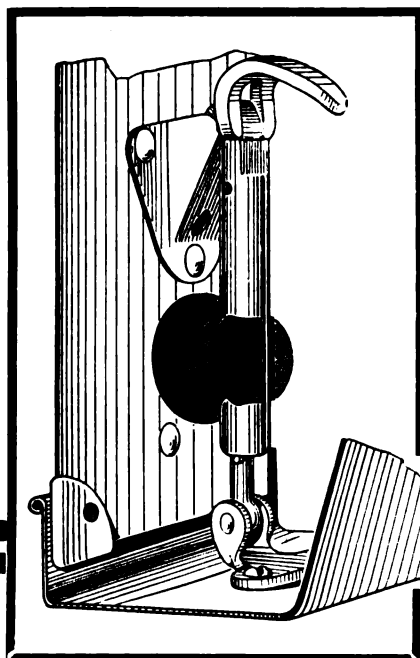
SYCAMORE

ILLINOIS

SH-H-H-H!

**Perfect Quiet. No More Hood Rattles.
The Jorgensen Hood-Silencer Stops Them Forever!**

Made of rubber in one piece, with hole in silencer on slant to conform with angle of hood-fasteners, and with vacuum cup at one side which fits close to the hood, preventing shifting. The Jorgensen has nothing to get out of order, does not mar the finish of the car, and holds firm over the roughest roads. It is rightly named—a "silencer."



Fits Dodge, Buick, Maxwell, Chevrolet, and other makes.

The touring season is on! Get a trial order today and reap the rewards from our fine dealer proposition.

H. G. Jorgensen
Hampton Road
Erie, Pa.

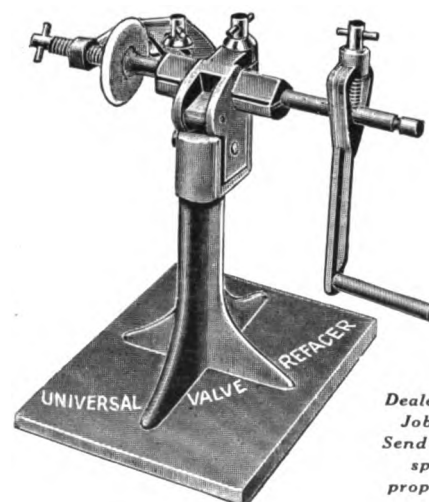
A Few Turns and the Job is Well Done

Valves usually thrown away can be quickly and easily put in A1 condition with the Universal Valve Re-facer. It refaces edges, thins and otherwise reshapes burned and distorted valve heads, saving much time usually spent in grinding. Valves with worn, grooved, or slightly warped stems properly handled. The most rapid valve re-facer made. Specially priced at \$7.00. If your jobber cannot supply you—order direct.

UNIVERSAL EQUIPMENT & SUPPLY CO.

Desk D-7
Syracuse

N. Y.



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Jobbers:
Send for our
special
proposition*

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Accessories—Dealers' Key to Profits

Pomeroy Gasifiers Give More Mileage and Battery Economy.

During the past four years, the Pomeroy patented electric gasifier has given service to thousands of automobilists. The manu-



Pomeroy Gasifier Makes Starting Easier.

facturers, however, confined their efforts to local territory until they felt assured they had proved absolutely that this device meets and overcomes one of the greatest difficulties which a car owner has in the winter—that of starting when the motor is cold.

The inventor, B. H. Pomeroy, experimented on his own car for two years, the present type of gasifier being the sixth model he has produced. It was logical to assume that, if the winter coldness could be displaced by summer heat, a car would start as easily in midwinter as it starts in midsummer.

Special attention is given to all the processes of manufacture involved in the production of Pomeroy gasifiers—over 40 operations being necessary before the device is ready for the customer's car. Each material used is thoroughly tested to be sure that it will withstand the demands which will be made upon it. Therefore, the manufacturers not only guarantee the Pomeroy gasifier to start any car as easily on the coldest winter day as it started on the hottest summer day, but they also guarantee every gasifier to last as long as the car.

The device has now been sold in 38 states, as well as in Canada, New Zealand and Cuba and, in each climate, has given pronounced service.

While the Pomeroy gasifier was invented to make cold-weather starting easy, automobilists quickly discovered, it is declared, that the spiral coil gave more mileage and, as the motor fired practically on the first application of the starter, there was also a decided saving of battery and starter.

It was also found that, by turning on the gasifier switch about 30 seconds before a hill was reached, the additional heat gave the gas extra force that made it possible to climb any hill on high.

The device is easily installed without removing parts, and draws but 10 amperes of current for about one minute.

The manufacturers attribute their success to the fact that they have given automobile owners who have used Pomeroy gasifiers a service that has made their cars more valuable all the year through.

Those interested may obtain prices and complete details by writing the Pomeroy Electric Co., Inc., 40 East Main street, Rochester, N. Y.

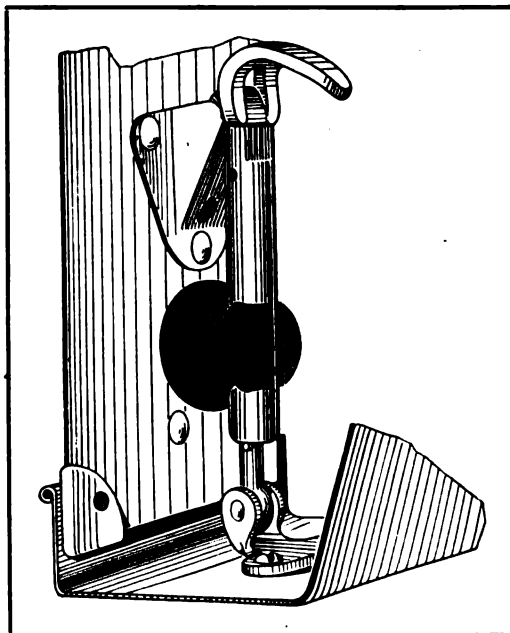
The Rougher the Road, the Tighter They Hold.

A simple and inexpensive method of doing away with a common annoyance—hood rattles—is offered in the Jorgensen hood-silencer, a new accessory which is both neat and efficient.

Jorgensen hood-silencers are made of rubber, in one piece, with a hole in the silencer on a slant to conform with the angle of the hood fasteners. A vacuum cup at one side fits up close to the hood, thus preventing shifting of the hood. Once attached, they are on to stay as there is nothing to get out of order.

The manufacturer guarantees that these hood-silencers will hold firmly over the roughest of roads and under any conditions, and will wear indefinitely.

In addition to the fact that the Jorgen-



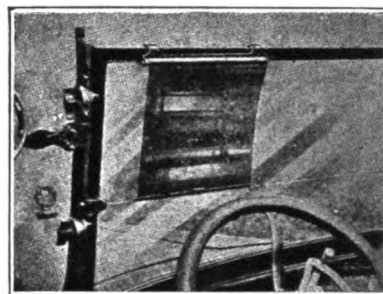
Jorgensen Hood-Silencer Neat and Efficient.

sen hood-silencers are being sold at an exceptionally attractive price, the manufacturer is giving a discount to dealers that will be of interest to those who are anxious to keep an accessory stock that will meet all demands.

Write H. G. Jorgensen, Hampton Road, Erie, Pa., for details.

Protection From Sun and Headlight Afforded by Amber Glaroscope.

In the amber glaroscope, its manufacturer is offering a device the safety and



Amber Glaroscope Saves Eyes and Nerves.

comfort of which will readily appeal to motorists everywhere.

Two flat hooks attach the amber glaroscope to the upper frame of the windshield—there are no bolts or nuts and nothing to come loose—and the protection which it affords against sun and headlight glare is a great saving of the eyes and nerves of the driver.

When not in use the glaroscope is rolled into its cylindrical metal case which is attached to the upper windshield frame.

When it is needed, the flexible, transparent, amber-tinted strip is simply pulled down—just as a window shade is pulled down—and hooked under the upper windshield glass.

Dealers and others interested will be forwarded full particulars by Hayden-Ohlson Co., 47 West 42d Street, New York City, upon request, directed to the address given.

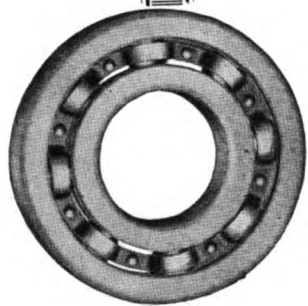
Take the Chatter from Ford Speed Bands with "Fosco."

The chattering and grabbing of the Ford speed bands is due to the forming of a glaze on the bands themselves.

The use of the ordinary lubricating oil will not remove this glaze, but a special preparation that has been generally sold the last year has proved most effective, it is said.

This preparation is called "Fosco," and its effect on the speed bands is to soften them and keep them in that condition of softness months after the application.

The application is simply made and the article itself is said to have won strong approval from Ford service men. It is manufactured by the Foster Mfg. Co., 36 West Gay St., Columbus, Ohio, which will promptly forward descriptive literature, prices, etc., to those requesting them.



Relieve Your Mind of Worry

Just send those old bearings to us for rebuilding. You'll save 50 percent and we'll absolutely guarantee that they'll be equal in all respects to new ones.

We will replace any used bearing you have with a Western guaranteed rebuilt—or, if the bearing is beyond repair, send you a new or rebuilt one at a great reduction in price.

WESTERN GUARANTEED REBUILT BEARINGS

are in use everywhere! We can supply you with rebuilt bearings, new ball and roller bearings—and steel balls—all makes.

Your inquiry will have our immediate attention.

Shipments are made same day order is received.

WESTERN BEARINGS CO.

2837 S. STATE ST.

CHICAGO, ILL.

Unique Construction that Positively Prevents Fouling

The **ASKO** SPARK PLUG is so designed that it burns off the oil from the vital parts as soon as it is deposited. Without this oil to bake in with the soot no carbon can form. The dry soot is easily disposed of—Simply blown out of the plug chamber with every exhaust. This method is infinitely superior to ineffectual efforts to prevent the deposit of soot and oil.

That the **ASKO** does not foul has been proved on thousands of cars of all makes under the most rigorous service conditions.

The **ASKO** is strictly a heavy duty plug—body all brass, heavy stone 775 insulator and oil splash plate.

Thousands in use—sells on its merits.

DEALERS—Write today for data.

Allen Specialty Co.

2751 West Lake St. CHICAGO



Manufacturers also of OWL Plugs especially designed for Fords and Fordsons

THE FRISZ WHEEL & GEAR PULLER

NEVER
SLIPS



Made in
FOUR SIZES
to take care
of all size
gears and
wheels

Don't Waste Time and Lose Money

fussing with a wheel puller that grips poorly and slips.

Get the Frisz Wheel and Gear Puller. Its massive gripping fingers hold like a ship's anchor. They never slip and their grip is equally automatic, whether expanding or contracting. The drop forged, high carbon, nickel steel arms are always parallel with the power screw. This means a pull always in a straight pull—an easy pull.

Free from complicated parts. Needs no special attachments. Made of finest materials; heavily reinforced where stresses come heaviest.

Get the Frisz Wheel and Gear Puller from your jobber—today.

JOBBERS—Write for our interesting proposition.

FRISZ MFG. CO.

34th and Illinois Sts.

Indianapolis, Ind.

"Give Us Asko Plugs," Say Pierce Arrow Owners—and Others.

Have you seen the new spark-plug which the distributors of the Pierce Arrow cars have been using this past year? Do you know that it is said to be a plug which entirely eliminates carbon and fouling troubles,

increases the mileage and affords a cold weather protection?

In numerous instances, it is declared, motor owners have reported a considerable saving per month on gasoline alone. In another case, an instance is cited of a heavy truck—the real test of any plug—which used Asko spark-plugs 14 months without changing or cleaning. This,

Asko Spark-Plug Built Wholly of Brass.

it is said, holds true with any engine, road condition or grade of gasoline.

Built wholly of brass, with a stone insulator, the Asko literally cleans itself. The conical nut, shown in the illustration, heats instantly and remains hot. The gas enters the opening and is broken up by the hot electrode and conical nut. Then comes the spark, the explosion and the blinding flash of flame in the cylinder. Complete ignition occurs and the firing points scour automatically.

Whether your customer's interest lies in a sweet, smooth-running engine, more mileage to the gallon of gasoline, long life to the motor or freedom from the dirty job of continually cleaning plugs, he will appreciate the advantages afforded by the use of Asko spark-plugs.

Asko plugs are fully guaranteed and are sold at an attractive price.

Further particulars will be promptly forwarded upon request by the manufacturers, the Allen Specialty Co., 2751 West Lake street, Chicago.

Rings Inserted in a "Jiffy" When Done the Cady Way.

There's good news for the repairman in the announcement by the Waglew Mfg.



Cady Piston Ring Compressor Entirely Automatic.

Co., of Syracuse, N. Y., of a piston ring compressor which, it is stated, is entirely automatic and requires no adjustments.

Further, the operation of the Cady piston

ring compressor is so simple that the work can be done with one hand, thus making it unnecessary for the workman to call an assistant to help him, and saving time.

All that is necessary is to draw the compressor over the lower end of the piston a short distance, place the piston in the cylinder and, with a little pressure on the top of the piston, the spring at the bottom of the compressor automatically closes the rings as they enter the cylinder.

Rings can also be placed on the pistons by slipping the ring over the spring end of the compressor.

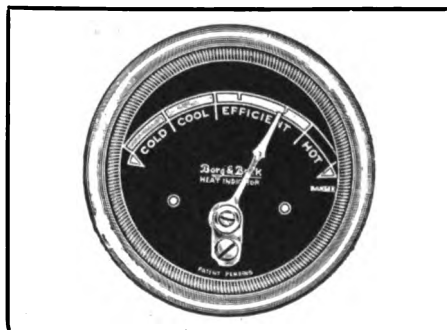
This tool, it is said, prevents all breakage of piston rings and instantly adjusts itself to all sizes and types of piston rings from 2¾ inches to 4½ inches in diameter, covering all the sizes of standard motors.

The Cady is constructed of the best material and is finished in white nickel.

The low price at which this handy device is now being offered makes it especially interesting to the garageman and repairman anxious to save time, patience and dollars. Write the Waglew Mfg. Co., 700-702 Manlius St., New York, for details.

New Heat Indicator Shows True Motor Temperature on Dash.

The Borg & Beck Co., which is no doubt well-known to most of our readers as the manufacturer of the Borg & Beck clutches, has now entered the accessory field and is



Hobbs Heat Indicator Tells Motor Temperature.

producing the Hobbs heat indicator shown in the illustration.

This instrument records motor temperature in plain sight on the instrument board, where it is visible day or night. It gives motor temperature through the medium of a thermostatic unit located on the motor block itself. Thus, it indicates the approach of overheating troubles without being affected in its accuracy by any defects in water circulation or by weather conditions.

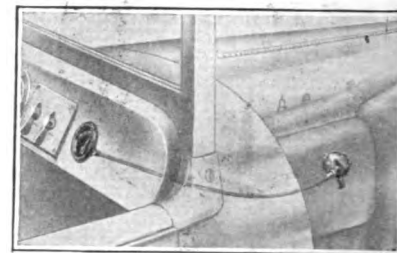
The installation is extremely simple, full instructions accompanying each instrument. After it is once installed and adjusted, no further attention is needed. Its reading accurately indicates the operating efficiency of the particular motor on which it may be installed.

A heat indicator device has long been recognized as necessary to guard against ap-

proaching motor trouble, and this instrument is said to be the latest development along this line.

It becomes a handsome appointment on the instrument board and, once installed, it is not likely to be stolen and will save many a repair bill by its warnings.

Its value in cold weather is also great,



Shows Installation of Heat Indicator.

enabling the driver to properly adjust radiator covers, etc., to insure obtaining maximum motor efficiency and the greatest possible operating economy.

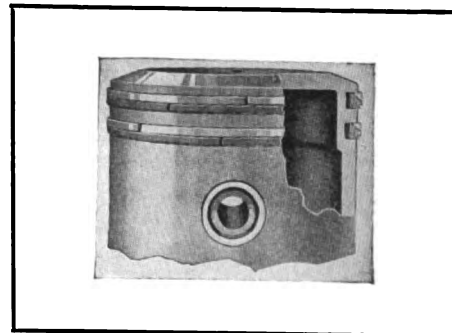
The illustration clearly shows its installation, one model being suitable for all cars, and it is sold complete at an extremely reasonable price.

Descriptive literature, prices, etc., will be forwarded to those interested who will write Borg & Beck Co., 9208 Michigan avenue, Chicago.

Mr. Dealer! This Is Why They Call for Kendell Rings!

Kendell piston rings embody a number of scientific and mechanical features that are arousing interest among the trade. They are of two-piece construction—an inner or expansion ring and an outer or packing ring.

A special analysis iron is being used, and this is further improved through a returning process on the expansion ring, producing what is termed an "even-radius"



Kendell Ring Has Non-Clogging Oil Wiper.

type ring which has a point of expansion every 30 degrees on the entire circle. All points have equal pressure. This is especially beneficial in slightly out-of-round cylinders. A non-clogging oil wiper is also provided on this section of the ring.

The outer or packing section is of softer, non-resilient iron, being turned with an inner surface on a 55-degree angle. The expansion ring has an externally inclined face

They Come to Me

I'm off the main highway, but I sell the goods because I have

National Guaranteed Coupon Books

My customers like the convenience of paying for petroleum products with coupons. They like the quick and accurate service. They like the saving where a discount is made for cash.

I profit because I have no bookkeeping to do. No more disputes with customers. And I get my money in advance.

YOU can sell NATIONAL GUARANTEED COUPON BOOKS for cash—or use them for charge business. Your sales will soar.

Start a coupon book campaign and they'll travel off the beaten path to buy from YOU.

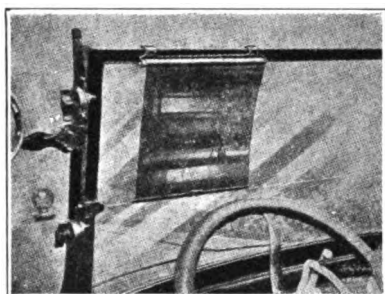
There are some samples and quotations waiting for you at

National Checking Company

271 Chestnut Street
ST. PAUL MINN.



The "Bexto" Amber Glaroscope



AN ACCIDENT PREVENTION

"PROTECTION"

from sun glare, headlight glare, headache. Protects the driver, the car and its occupants. Transparent.

Hangs on the windshield—on in an instant. Pulls up and down like a window shade—its spring roller does it. Send your order for a dozen Amber Glaroscopes today. When they arrive put one on your own car and see how fast you sell them. Profits are worth while. Turnover is fast. Retail price—\$2.00.

Fits all makes and models.

Special size for cars equipped with automatic windshield cleaners.

No bolts or nuts.

If your jobber cannot supply you, order direct. Our discounts are correct.

HAYDEN-OHLSON COMPANY

47 WEST 42nd St.

NEW YORK CITY

BLACK & WHITE VALVE GRINDING COMPOUND

THE FASTEST CUTTING OF ALL COMPOUNDS

BLACK & WHITE combines rapid cutting and smooth finishing qualities to a remarkable degree. The result of long experimentation—composed of several grades of abrasives and a superior grade of petroleum jelly. Cuts and polishes valves and valve seats instead of tearing the steel. Removes pits, carbon spots and leaves valve seats clean and true. Put BLACK & WHITE to the test. Secure a 50c 5 oz. can at half price. Fill out coupon below and attach to your letterhead or business card and mail with 25c in stamps—today.

Distributors wanted. A splendid proposition! Write for particulars.

ABRASIVE SALES CORP.

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New York City

FACTORY, MT. VERNON, N. Y.

Name

Address

City..... State.....

Jobber

of the same angularity, thereby relieving groove pressure, increasing pressure on the circumference and lengthening the life of the expansion ring. This has also proved to be a non-carboning feature.

All drawbacks, such as deepening ring grooves, drilling of pistons, oil regulations, springs, pins and other objectional features have been eliminated. The ring is also backed up by the manufacturer with an absolute money-back guarantee.

For further details address Department (M) Kendell Engineering Corp., Fort Wayne, Ind.

You Have It in "Black & White"—

A Real Grinding Compound.

Six big factories are busily engaged in turning out Black & White valve grinding compound, a quick cutting, smooth finishing compound, which the Abrasives Sales Corp. of New York City is manufacturing for the use of service stations. It is stock equipment and is being used in over 40 automobile service stations in New York City alone.

Carefully selected abrasives are used in the manufacture of Black & White grind-

ing compound. It is composed of several grades of abrasives and a superior grade of petroleum jelly.

In addition to putting a smooth finish on the valve and seat, it is stated that this compound will remove pits, carbon spots and leave the valve seats clean and true, and furthermore will not line or ring the valve seats.

Dealers will find it worth while to write the Abrasives Sales Corp., New York, N. Y., for the special and very attractive proposition is being made to dealers and jobbers.

Up-to-the-Minute Garage Equipment

Two Splendid Tools for the Busy Tire Repairmen.

When either a "half-sole" or patching job is to be done on the tire, the bead must, of course, be removed. This is a job which the Progressive tire or bead cutter has been designed to handle quickly, cleanly and easily.

The Progressive tire or bead cutter was developed at the time when "resoling" the tire was found to be a practical way to conserve on tire expense, and it is now being used in many shops where the old tire is cut up into several parts and used for patching.

You do not need to cut the bead by hand first, as the head of this machine is so hinged that the tire can be placed between the two circular knives without this. The knives are constructed with a patented feed device for feeding the tire along when cutting. All the operator needs to do is to guide the tire—the machine does the rest.

Another Progressive product, the practical value of which tire men will be quick to recognize, is the Progressive tire skiver

for skiving edges of tire fabric, patches, boots and reliners or casings to be used in sewing one tire over another.

These skivers have wide blades and make wide cuts. Any bevel wanted can be easily obtained, it is stated, and the machines are automatically adjusted for different thicknesses of stock. Their construction is such that it is possible to cut on a curve as well as straight. A positive knife adjustment makes it practically impossible to set the blade wrong.

The Progressive skivers are made in three models, one of which is shown in the illustration. This model is known as the "Progressive Improved" and is a hand-power skiver which is specially designed for use in smaller repair shops.

Descriptive literature, prices, etc., will be promptly forwarded to those interested by the P. S. M. Co., 3116-36 Snelling Ave., S., Minneapolis, Minn.

Tire Men! Do You Want Bigger Business? Then Read This.

More and more each day men are coming to realize the wonderful possibilities of electricity and its efficiency in increasing powers in the operation of machinery and tools of all kinds.

Of particular interest, then, to tire repairmen are the vulcanizers and tube plates which the P. S. M. Co. of Minneapolis, Minn., is marketing.

The Progressive electric casing vulcanizer, three cavity outfit, which is shown in one of the illustrations, includes 3 to 3½-inch, 4 to 4½-inch and 5 to 5½-inch cavities, with a 24-inch tube plate and 4 C clamps. Each mold is equipped with one pair of straight side molds and one pair of clincher bead molds.

Progressive electric tube plates are made in two sizes—one 9 ins. by 5 ins., with one C clamp, and

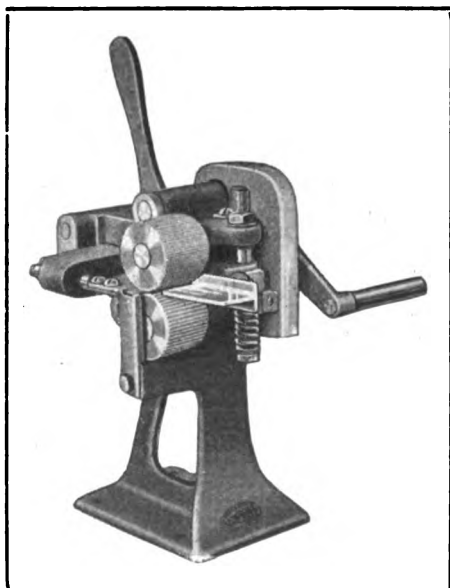
the other 24 ins. by 5 ins., with four C clamps, cord and plug.

Precisely the right vulcanizing heat can be quickly developed, it is stated, not varying above or below until turned off. There is no danger of burning tubes or casings.

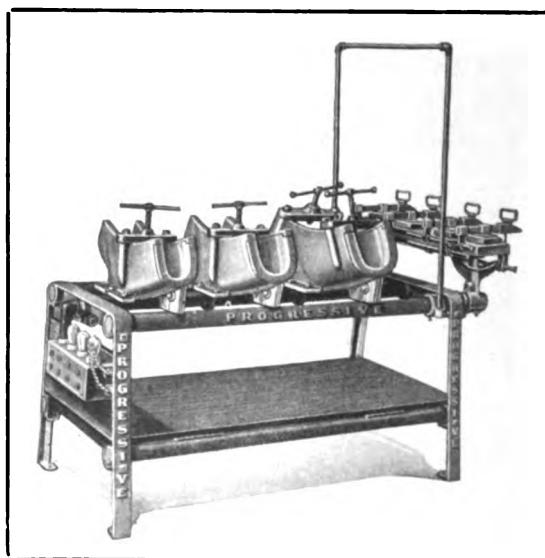
The operation of these vulcanizers and tube plates is economical, since heating the tube plate requires only three amperes of current and the average current needed per cavity of the casing vulcanizer is only six amperes. In addition, they are absolutely safe and all chance of shock, burning or other injuries to yourself or your shop have been effectively eliminated.

They are ready for work instantly. The proper heat is quickly attained after the switch is turned. The tube plate requires only 10 minutes to become fully heated, and the average time required for the casing vulcanizer is only 45 minutes. Vulcanizing heat can be obtained in any one of the cavities or on the tube plate without heating up the rest of the machine.

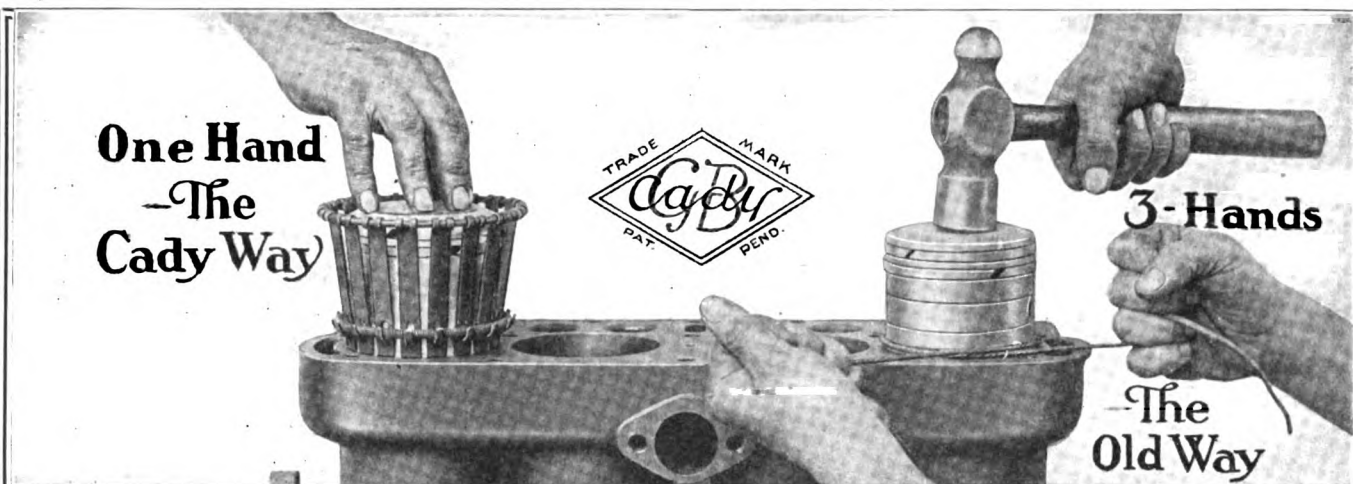
Users of Progressive electric vulcanizers and tube plates are not troubled by excessive heat in the summer and, since there



Progressive Skiver Gives Any Bevel Wanted.



Progressive Three Cavity Casing Vulcanizer Outfit.



Compresses All Rings on a Piston with One Operation

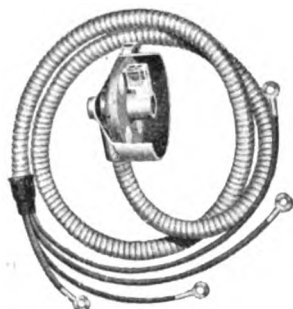
It doesn't "just happen" that the Cady Piston Ring Compressor is a time and patience saver and performs its work in a jiffy. The Cady Piston Ring Compressor is "made" to handle the work that way! It's entirely automatic and instantly adjusts itself to all size pistons within the range of $2\frac{3}{4}$ to $4\frac{1}{2}$ ins. Just draw the compressor over lower end

of piston a short distance, then place piston in the cylinder and with a little pressure on top of piston the spring at bottom of compressor automatically closes the rings as they enter the cylinder. Finished in white nickel. Price—\$2.50. Order this up-to-the-minute compressor—today.

WAGLEW MANUFACTURING CO.

700-702 Manlius St.

Syracuse, N. Y.



TURNER

2 in 1

TIMER

Has stood repeated and rigid tests for over five years and has proven a genuine quality article and a boon to every Ford owner. Increases power, insures an instant start in all weather, lessens fouling of two front plugs, saves gasoline and stops motor "kicking." Is oil, grease and water proof. Requires no oiling and is easily installed.

TURNER FOOT ACCELERATOR

For Fords. Gives positive and quick throttling and allows use of both hands in driving. Installed in 10 minutes by anyone. Simple and durable. Price, \$1.

SPRING SPREADER AND LUBRICATOR

Greatly increases riding qualities of any car, stops squeaks and spring breakage and increases spring wear. Makes steering easier and saves tires. The only device made that spreads spring leaves and lubricates them in one operation without fuss or muss. For all cars. Price \$2.50.

For convenience of car owner we furnish 1-lb. cans of special spring lubricant for use with our Lubricator.

Turner Manufacturing Co.

KOKOMO, INDIANA



**CLARK'S
UNITYPE**

**We Sell Your
Used Cars**

—and you know it's the hardest problem in the business today to keep them from stacking up on your hands.

"UNITYPES"

actually sell them for you—besides they bring new customers off the street into your place—to buy—

You could afford to invest in ten or twenty of them,—but you don't need to—one or two will dress up your window and be live, silent salesmen as well.

In use all over the world.

Made in many styles and at prices from \$3.50 up.

Ask for catalog "A. G.-20" applied to Auto Dealers.

W. L. CLARK COMPANY, Inc.

538 Pearl Street New York
Patentees and Exclusive Makers.

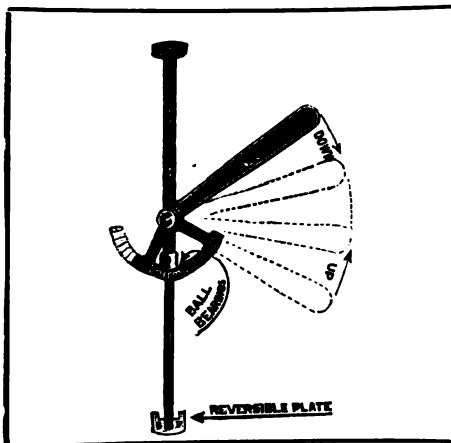
are no pipes to freeze or burst—no water being used with them—the expense and loss of time due to such mishaps in the cold months are eliminated.

A Progressive vulcanizer can be placed anywhere in the shop and can be moved about at your convenience. It is only necessary to connect the cord and plug to your electric circuit and you are ready for work.

Write the Progressive Shoe Machinery Co., 3116-36 Snelling Ave., S., Minneapolis, Minn., for further details concerning its vulcanizers and tube plates. Information regarding the easy payment plan for the purchase of Progressive electric vulcanizers will also be supplied to those requesting it.

Taking the "Grind" Out of Your Valve Grinding.

A natural easy pump action that keeps the workman away from all obstructions is an outstanding feature of the Royal valve grinder which is being marketed by the



Royal Valve Grinder Time and Labor Saver.

Universal Equipment & Supply Co., of Syracuse, N. Y.

It is so designed that you can do with it whatever the hardness, size and condition of the valve requires, thus it is said, doing the best work in the easiest and quickest way.

A valve can be "roughed in" with the Royal valve grinder by putting weight on the tool and using the full stroke of the handle, thus revolving the valve 1½ complete turns and back without danger of cutting a rim in the valves. This is because, with the ball-bearing, single-gear and long handle, you can "feel the work."

Much time and labor can often be saved by "roughing in." Since the oscillating motion of any length can be used on any part of a turn, a high spot or high side on the valve can be ground against a high spot or high side on the seat, grinding only high spots against high spots. This, of course, is a saving of the valve and the seat.

Finishing up can be done by using the full stroke or any part thereof, thus grind-

ing with the oscillating motion on anything from ¼ to 1½ turns, shifting from any part of the turn to any other by simply raising or lowering the handle. Being able to "feel the work," one knows instantly, it is said, when the compound begins failing to cut.

The Royal valve grinder is equipped with an adjustable plate, making it very easy and handy to use and always ready for grinding all valves.

A long shank and a long handle keep the grinder clear of obstructions on all motors. The handle design gives a leverage of 5 to 1. Its ball-bearing and bevel gear are designed to give non-binding and easy action, while the perfect balance and general design, it is said, eliminate all tendency to jump out of the valve.

The valve spring which is furnished with each grinder raises the valve when the hand is removed from the grinder for inspection, replenishment of compound, etc. When the grinder is not in use it can be hung on a nail or occupies little space in a tool kit.

A Royal valve grinder has no loose parts. An even pressure on the valve is assured at all times, it is declared, and the stroke never stops twice in exactly the same place in the valve.

The exceptionally low price at which this tool is being offered, combined with its many advantageous features, make it a real "buy" in the way of garage equipment.

Descriptive literature and other details desired will be forwarded to all requesting them by the Universal Equipment & Supply Co., Desk D-7, Syracuse, N. Y.

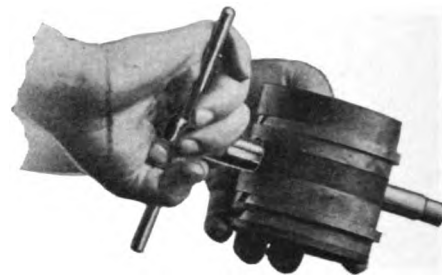
It's Easy to Extract Bushings With a Holly.

One of the greatest aids to selling service is in the possession of good tools—tools that will do the work quickly and efficiently and save time and labor.

Among the garage tools which are to be included in this classification are the Holly bushing extractors which the Rosier-

Howard Corp. is putting out. These are designed to extract bushing ranging in size from ⅝ inch to 2 5/16 inches inclusive, and will take care of all bushings in any make of car, truck or tractor, it is stated.

The Holly bushing extractor is very



No Cracked Pistons When Holly Is Used.

simple of operation. All that is necessary is to screw the tool into the bushing with the hands—no wrench or other tool is needed—and then tap the small end with a hammer or on a vise. Several light taps will loosen the bushing quickly. When the bushing is out, it can readily be removed from the tool with a pair of pliers.

While these tools may be purchased singly and are made to handle all sizes of bushings for any car, truck or tractor, the manufacturer recommends their purchase in sets for the attainment of the best shop efficiency. These sets are so combined as to give the repairman only such tools as he actually needs.

A Ford dealer would want the special Ford set, which consists of tools Nos. 1, 2, 3, 4 and 79, and extracts all bushings in Ford cars and trucks.

A service station handling repair work on all makes of automobiles, trucks and tractors will want the standard set and the No. 579 tool. The standard set includes tools Nos. 0, 1, 2, 3, 4 and 34B.

No. 0 tool extracts rocker arm bushings, water pump bushings, commutator shaft bushings and all others ranging in size from ⅝-in. to 7/16-inch inclusive.

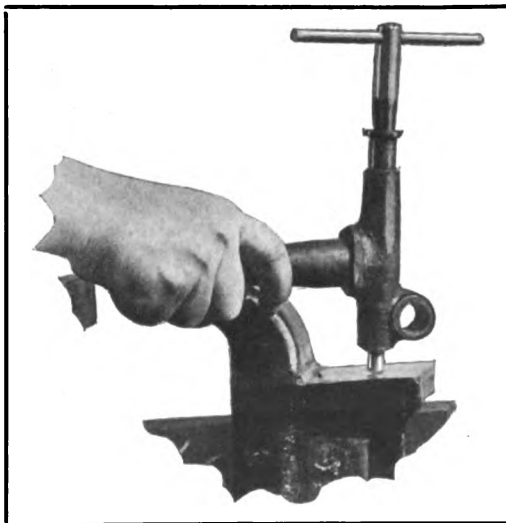
No. 1 tool extracts ten bushings in the Ford, also a large number in other standard makes of cars; any bushing ranging in size from ½-inch to 9/16-inch inclusive.

No. 2 tool extracts bushings from ⅝-inch to 11/16-inch inclusive.

No. 3 tool extracts bushings from 47/64-inch to 13/16-inch inclusive.

No. 4 tool extracts bushings from ⅝-inch to 1 1/16-inch inclusive. It also extracts the transmission driving plate assembly bushing.

No. 34B is a combination tool, consisting of a taper sleeve or spool working on a threaded pin or spindle, and is for the purpose of extracting pocket or dead-end bushings ranging in size from ¾-inch to 1 1/16-inch inside diameter.

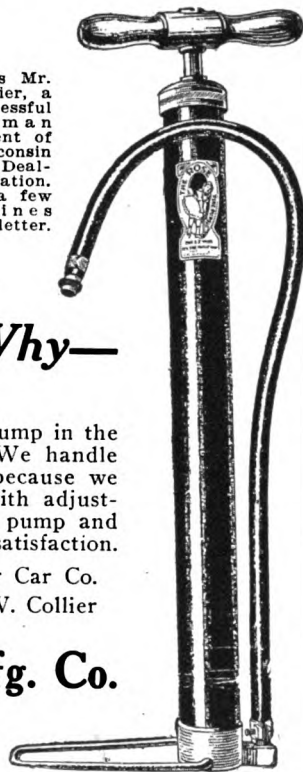


No. 1 Holly Extracting Ford Spindle Body Bushing.

"We Handle ROSE Pumps Exclusively"



Thus writes Mr. C. W. Collier, a very successful business man and president of the Wisconsin Automobile Dealers' Association. We quote a few pointed lines from his letter.



And This Is Why—

Gentlemen:—

We know of no better pump in the country than the Rose. We handle them exclusively, mainly because we never have any trouble with adjustments. It is a well built pump and has always given entire satisfaction.

Fox River Motor Car Co.

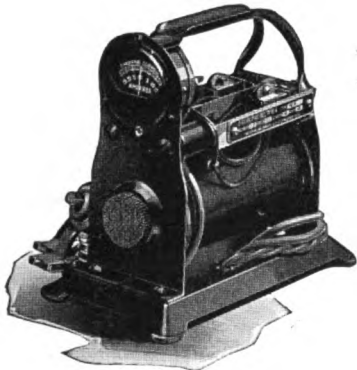
(Signed) C. W. Collier

Frank Rose Mfg. Co.

HASTINGS,
NEBRASKA

The Sterling

PORTABLE RECTIFIER



against over charging. Dash connection, if desired. Simply insert plug in dash to charge.

Initial charging rate 6-volt battery, either 5 or 10 amperes.
Price complete\$16.00
West of Rocky Mountains, \$17.00

OTHER STERLING PRODUCTS—

Dash and Pocket Ammeters and Voltmeters,
High Rate Cell Tester, Magneto-Meter,
Polarity Indicator and Spring Oilier.

Ask your jobber or write direct for Bulletins

THE STERLING MFG. CO.

2849 Prospect Ave.

Cleveland, Ohio

Over Two Million Sterling Instruments in use today.

LEATHER Automotive Products

Genuine leather products have come back into their own. They are better than substitute materials and **now are as low priced.** That's why every dealer should be interested in our complete line—

Wetprufe Flat Fan Belting

Vee-Flex, Vee-Sol and V-Lug Roll Fan Belting

Tough-Tan Leather V-Belts

Leathertex and Wetprufe Cone Clutch Facings

Universal Joint Discs

Anti-Squeak Lacing



Our Group Fan Belts are especially popular this year. They enable dealers to fill all ordinary requirements from a very compact stock. The "Popular" Group (shown above) accommodates 212—and the "Favorite" Group accommodates 288—leading makes and models of cars, trucks and tractors. Also, keep in mind—



**Flat Fan Belting
in Rolls**

Sold by leading dealers everywhere. Ask your jobber for full information or write today for our complete catalog and discounts.

HIDE, LEATHER & BELTING CO.

Established 1870

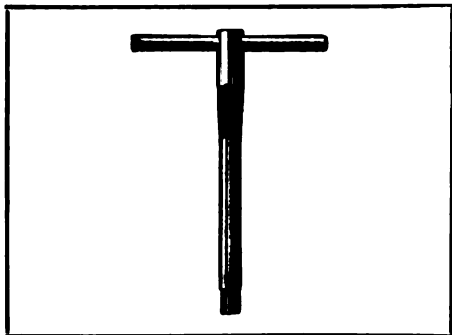
DETROIT
EVANSVILLE

INDIANAPOLIS

MEMPHIS
NEW YORK

No. 579 tool extracts bushings from 1 1/16 inches to 2 5/16 inches, inclusive.

The Rosier-Howard Corp. states that the Ford Motor Co. has recommended the Holly bushing extractor to its dealers and



Style Tools Nos. 1, 2, 3 & 4.

service stations and has also purchased an 18-tool set, special sizes, to be used in extracting bushings from their factory machinery. They further state that Dodge Bros. are using a 6-tool set for the same purpose, and the Chevrolet Motor Co. has shown these tools in their service manual, recommending them to their dealers.

The Holly bushing extractor sets come packed in a neat wooden case, each tool having its own particular slot.

Write the Rosier-Howard Corp., 307 National, Hutchinson, Kans., for particulars regarding their special discount to dealers.

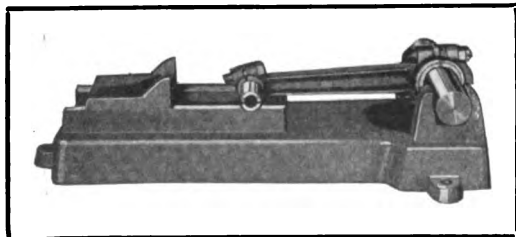
Rods Bent to Alignment Right in Jig By the Waller.

"Fine," said the mechanic, as he looked at the completed job. "That's a good job. If I do say it myself. Now, if you want to hear sweet music, just listen to that motor run!" But—

Yes, there it was. There was no denying the presence of that slight but persistent knock, and the satisfied smile on the mechanic's face was replaced by a puzzled frown.

"Now, what's the matter?" he exclaimed disgustedly. "I know that every piston and pin is fitted good and close and every bearing is adjusted perfectly. I don't see—"

But a few minutes later he did see. Just



Bends Rods to Alignment Right in Jig.

a little twist in the rod was sufficient to cause the faint but annoying knock that he heard.

In overhauling a motor, it is most important that all connecting rods be tested

before replacing them in the motor, as a bent or twisted rod will cause a slap or knock. It frequently happens that motor overhaul jobs "come back" with "knocks" simply because the connecting rods, were not tested before the motor was assembled.

The success of your service department is dependent upon the good will of your customers. That's why you will be interested in hearing about a new piece of equipment which is being marketed that can greatly aid in assuring this good will.

The Waller connecting-rod aligning jig has been designed so that rods can be bent to alignment right in the jig. It is not necessary to put the rod in a vise to bend or twist it, nor is it necessary to bend a rod four or five times before it is perfectly true. The work is all done by putting the rod in the jig just the one time.

By machining the sliding leaf and bed of this device perfectly parallel with the mandrel, the greatest accuracy in aligning the rod has been assured, it is said.

Further, the jig is so designed that it is claimed that the slightest twist or bend can be detected with one operation, and it is so constructed that the rod may be straightened without removing it from the jig.

Waller connecting-rod aligning jigs are designed for all makes of cars, trucks and tractors, and are sold at a very attractive price.

You will want to know more about this efficient shop helper, and can obtain complete details by writing the the manufacturer, the Waller Mfg. Co., Oelwein, Iowa.

For a Better, Quicker Job and More Profit Try Huetter Gear Bands.

One of the details of construction of the Huetter flywheel gear band which will particularly interest garage repairmen is that each tooth is pointed or beveled in a way that gives easy positive quiet meshing with the starter pinion.

The teeth are pointed on both sides of the gear, thus making it possible for the same gear to be installed on cars where the starter pinion enters from different sides. Further, it is said that this construction practically eliminates locking, battering and chipping.

Flywheels are, as a rule, made entirely from cast iron. Naturally, cast-iron teeth are brittle and full of small flaws and, as a result, they wear out quickly. By replacing with a new flywheel, the garageman may throw the motor out of balance, or, in other words, when a new flywheel is installed the motor is torn down in the shop for a longer period, awaiting the new flywheel. Thus the cost of installation is heavier and the profit less.

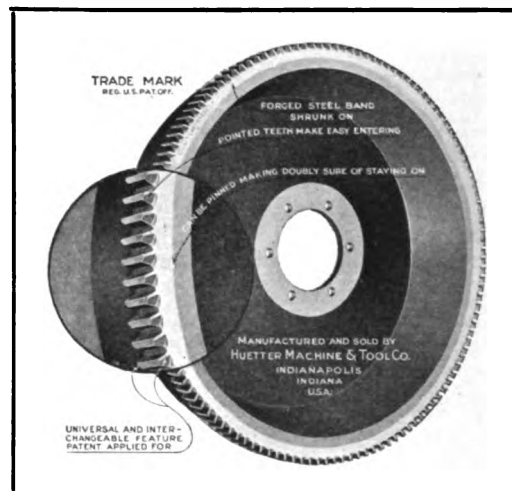
Huetter flywheel gear bands are made

from high-carbon steel, according to the specifications of the manufacturer and, it is said, practically always last the lifetime of a car. They are electrically welded, thus precluding the possibility of a weakness in a seam, and are machined and ground by special processes.

It is very easy for the repairman to use Huetter gears. He has only to machine the flywheel down to the dimensions given on the gear band and shrink the gear on the wheel. Thus, it is declared, the customer is given a better and less costly job, the job can be done more quickly and the profit is greater.

Huetter flywheel gear bands are made in every size and gear pitch, both in straight and spiral gears, and for every standard motor built.

Those repairmen who are not prepared to keep a complete stock of Huetter gears on hand can secure them direct from their jobbers or from the factory very promptly. By means of a catalog, which the manufacturer will gladly send to repairmen or



Huetter Gear Bands Easy to Use.

dealers requesting it, exactly the right gear can be ordered.

Ask the Huetter Machine & Tool Co., Div. X 1, 545 Kentucky avenue, Indianapolis, Ind., to send you this catalog and its special circular describing the causes of gear stripping.

John D. Carmody Joins Sales Force of Weaver Mfg. Co.

A number of our readers will doubtless be interested in knowing that John D. Carmody has recently joined the sales force of the Weaver Mfg. Co., Springfield, Ill., manufacturer of the Weaver line of garage and shop equipment.

Mr. Carmody's territory includes Michigan, Indiana, Ohio and Kentucky, as well as the following cities: Buffalo, N. Y., Pittsburgh, Johnstown, Erie and Oil City, Pa., Wheeling, Parkersburg, Huntington, Charleston, Clarksburg and Elkins, W. Va.

John D. Carmody is well known in the automotive industry, having been con-



IN 8 WEEKS the fall demand for the **POMEROY PATENTED ELECTRIC GASAFIER**

will be in full swing. Not too much time to get delivery on your supply.

Remember the **POMEROY GASAFIER** stands for *easy cold weather starting*, saves 15% gasoline, relieves strain on battery and makes hill-climbing easy. \$5 complete. New free circular just printed.

Now in its 5th selling year. Possibly your territory is open. Write us.

POMEROY ELECTRIC CO., Inc., Manufacturers

40 East Main Street, **Rochester, N. Y.**

INSTANSEAT seat instantly PISTON RINGS

Dealers say—"It pays to handle INSTANSEAT rings because:

Customers desire quick results—
Preventing passage of excess oil
guarantees against come-back jobs—
Individual virgin grey iron castings
insure good results after long usage—
and because

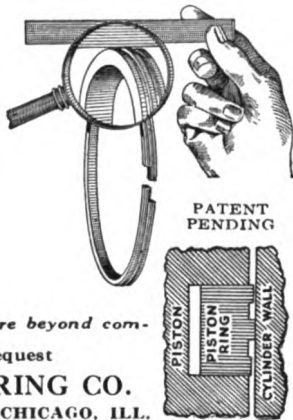
Quality, prices, and discounts are beyond comparison.

Sample ring mailed on request

KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL.



Concentrated Force

Mr. Culp Says:



With factories consolidated on one hand, and retailers on the other, and the Culp-Plan as the connecting link, dealers can secure goods on a cost plus 10 per cent basis.

Bulletin No. 9 tells you the way.

George K. Culp, Inc.

56 West 45th St.

New York City

"PRO-TEX-OIL" THE MIRACLE LUBRICANT

FOR FORD CARS and FORD TRUCKS

"PRO-TEX-OIL" is a high grade, natural, rich automobile oil, refined from Pennsylvania Crude, manufactured and compounded in such a way as to permit it to retain a larger percentage of lubricating fat than through the ordinary refining process. Through the process in which we manufacture this oil, it retains its natural lubricating fat which greatly improves the lubricating qualities and accomplishes its most important object which is THE ABSOLUTE ELIMINATION OF CHATTERING in Ford cars and Ford trucks.

It is a known fact that by not stopping this chattering when you have the means of doing so (using our "PRO-TEX-OIL") you are absolutely shaking your Ford car into the repair shop and this means a big additional expense.

By eliminating the chattering you eliminate the loose bolts and nuts in all parts of the Ford car or truck. Practically all transmission troubles and rear axle troubles are caused by this unnecessary chattering.

"PRO-TEX-OIL" eliminates the changing of brake-bands to stop the chattering. The result is that PRO-TEX-OIL will give more mileage on oil and gasoline, more power, no excess carbon, and the absolute elimination of the

annoying succession of jerks and jars you get every time you brake down your car or reverse it.

A Ford car or truck is usually selected from the standpoint of economy and it really lives up to its reputation in this respect. Automobile Oil is practically the most important part of your car, therefore, our "PRO-TEX-OIL" is the most important and should have first consideration.

"PRO-TEX-OIL" IS THE GREATEST SHOCK ABSORBER OF THEM ALL—absolutely no annoyance from bumps and shocks when applying the brakes if you use our "PRO-TEX-OIL" for your Ford cars or trucks.

OUR GUARANTEE

"PRO-TEX-OIL" is guaranteed to immediately stop the chattering in the brake-bands, to increase the power and leave no excess carbon residue. By that we mean the carbon residue from PRO-TEX-OIL is less than that from other oils as "PRO-TEX-OIL" is refined from Pennsylvania Crude.

"PRO-TEX-OIL" is the greatest achievement in Ford automobile lubrication.

Dealers and Jobbers Wanted: Territory going fast; write or telegraph for territory.

THE REPUBLIC PRODUCTS COMPANY

PROSPECT BUILDING
CLEVELAND, OHIO, U. S. A.

"I am very much pleased with the AMERICAN GARAGE and AUTO DEALER. I got one idea from you that will just double my sales in 1922."

WM. J. BRAUN,
Braun Vulcanizing Co.
Wahpeton, N. Dakota.

KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

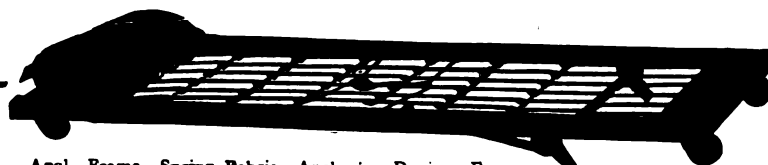
Made only by

THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.

Canadian Branch Factory at Woodstock Ont.

Foster

Auto Repair Creeper
METAL CONSTRUCTION



Angl. Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

FOSTER BROS. MFG. CO., UTICA, N. Y., U. S. A.

\$5.00

Ask for the name of the Foster distributor in your territory.

DIRECT REPRESENTATIVES
Eastern and Southern States: Ash & Co., 16-24 W. 61st St., New York, N. Y. For the Mid-West: Jessop & Thompson, 1421 S. Michigan Ave., Chicago, Ill. Pacific Coast & Inter-mountain Territory: McDonald & Linforth, 739 Call Bldg., San Francisco, Cal.

nected with the Champion Spark-Plug Co. for a number of years and more recently with the Wainright Piston Ring Co., until its consolidation with the McQuay Morris Mfg. Co. Mr. Carmody is making his home at 120 Hamilton Ave., Apt. 16, Columbus, Ohio.

Why Not Save the Profits Thrown On the Scrap Pile?

A business which is of considerable value to the motor service industry—and one which shows indications of considerable expansion as soon as motor owners are made aware of its advantages—is that of rebuilding ball-bearings.

The cost of the larger bearings is mainly dependent upon the value of the material which goes into their make-up. Therefore, by salvaging this material, a rebuilt bearing can be produced at a lower cost, so that its selling price is far below that of a new bearing.

Of course, the salvaging of ball-bearings requires specialized equipment—similar in most respects to that which is necessary for the production of new bearings. Excellent examples of the high-grade machine tools used for this work may be found in the shop of the Western Bearings Co., of Chicago.

This shop carries all the standard bearings in stock, so that replacements may be made with great promptness when bearings are sent in by customers for rebuilding.

The process of handling these bearings is an interesting one. Upon removal from the cars, the old bearings are sent in to the shop. A price, which is dependent upon the condition of the parts sent in, is fixed for the new bearing, and the customer is billed at about one-half of what a similar new bearing would cost him.

Old bearings are not reworked immediately upon receipt but are placed in stock bins until a sufficient quantity of one size has accumulated to justify the work of setting up the machines for the operations involved in refinishing the races. This work can be applied to a great variety of different type bearings, among which are: Light and heavy radial bearings—the latter from the rear axle of heavy trucks—and differential and propeller shaft thrust bearings.

When a lot of bearings is taken into the shop

for the rebuilding operations, the bearings are first completely torn down, the old balls and retainers discarded, and the races carefully washed free from grease and inspected for diameter and flaws.

Ball-races are reground to certain designated sizes, larger than their original ball diameter, and then fitted with oversize balls. This process, it is stated, restores them to a condition equal to that possessed by the original bearings.

Bearings which have been mounted loose on a shaft are most likely to be large in the bore, and a careful inspection is made to eliminate all such defective parts. The refinishing operations on the races begin with the work of regrinding the ball groove of the outside race, on the Rivett grinder. The inside race is handled in a similar manner.

The grinding operations remove all worn and cut-bearing marks from the face of the race and restore it to a condition equal to new, it is stated. Following the grinding, another inspection is made to insure that the races have been accurately ground. Then the outside races are matched up and fitted with inside races and oversize balls—each inner race being ground individually to fit the outer race perfectly.

The raceways are polished to a mirror finish, then carefully assembled, washed and again inspected, after which new ball retainers are fitted and riveted together.

This company possesses punches and forming dies for retainer rings of all sizes of bearings which it finishes, and these retainers are furnished to the assemblers, together with small stud rivets which are produced on an automatic screw machine.

Other inspections and washings follow

the complete assembly of the bearings, and they are then dipped in an anti-rust grease and packed into individual carton containers with an oil-paper wrapping to insure their receipt by the customer in good condition. All rebuilt bearings are thus prepared before transfer to the stockroom, and the Western Bearings Co. fully guarantees its product in the same manner as does the manufacturer of new bearings.

Write the Western Bearings Co., 2831-3-5 State St., Chicago, for full particulars concerning its money-saving plan.

Department of Commerce May Enforce Use of Alcohol.

Consul Wesley Frost, at Marseille, reports to the Department of Commerce that the French government is contemplating the enforced use as motor fuel of a new mixture composed of alcohol, gasoline, cyclohexanol and phenol, partly in order to dispose of great accumulations of alcohol and partly to reduce the country's dependency for mineral oils on the United States, Great Britain and Holland.

Various interests have been attempting to find an assured market for the alcohol distilled from sugar beets, surplus wines, and vegetable products. The quantities of such alcohol produced in any year fluctuate, and the growers would like to be assured against over-production by an arrangement which would always enable them to convert their surplus into alcohol at remunerative prices.

The difficulties have hitherto been that the price of the alcohol has been somewhat higher than the price of gasoline so that the resulting mixture would be somewhat more expensive than gasoline. Under the terms of the Beziers Concordat, the French government would establish a national alcohol office possessing a monopoly of the purchase and sale of alcohol; and this office would produce the carburant national. It would be subsidized by a tax of one franc per hectoliter on all wine marketed in France and of 50 centimes per hectoliter on all cider marketed. It is claimed that the resulting funds could be used to reduce the price of alcohol to such an extent that consumers of the new mixture would not suffer financially.

There is said to be some possibility of legislation which will result in the replacing of gasoline throughout France by a mixture containing 90 per cent gasoline and 10 per cent alcohol.

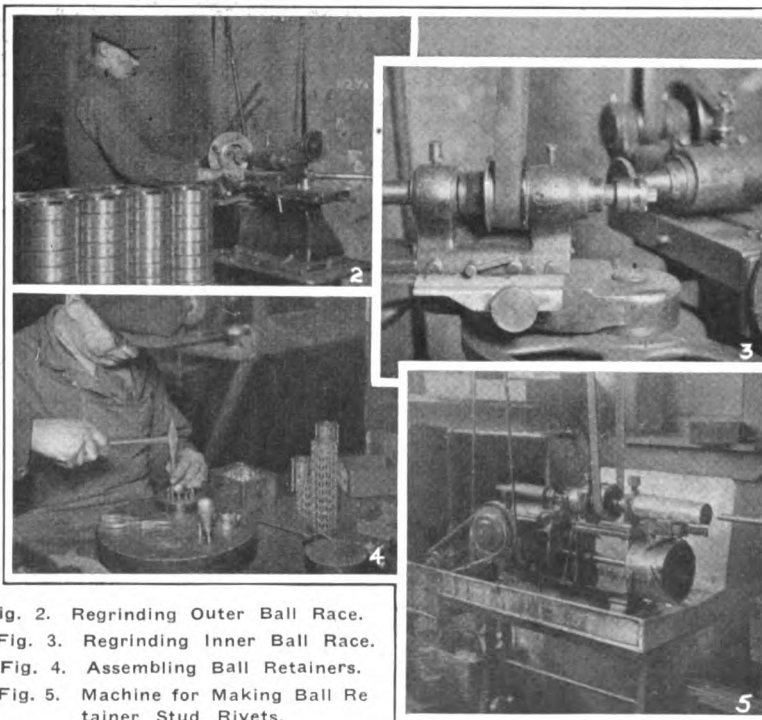
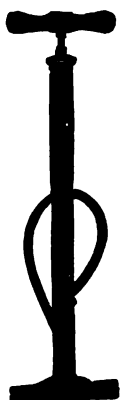


Fig. 2. Regrinding Outer Ball Race.
Fig. 3. Regrinding Inner Ball Race.
Fig. 4. Assembling Ball Retainers.
Fig. 5. Machine for Making Ball Retainer Stud Rivets.

AUTOQUIP PUMPS



No. 31. Peerless Steel Barrel Anchored into base by Patented Process. Quick acting air chuck, heavy tubing, reinforced base with special ground grip flanges.

PROFIT Plus ECONOMY

There is profit for the dealer in selling one line of pumps—if within that scope he has A SIZE — A STYLE — A PRICE to satisfy every customer. There is also economy, for his turn-over is naturally big.

AUTOQUIP Pumps are so recognized.

Write today for prices and discounts. Giving name of your Jobber.



No. 21 Paramount. High grade single acting pump. LOX-on Jr. Air Chuck. Brass Tube and Brass Check Valve. Heavy Reinforced Base, length 21" over all. A LIFE LONG PUMP.

Autoquip Mfg Co. Inc.

ROCHESTER, N. Y.
MANUFACTURERS OF

LOCKTYPE ANTI-RATTLERS



A line that
will pay
you to sell

SUPERBESTOS Folded and Stitched BRAKE LINING

outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.

DEALERS and REPAIRMEN—
Write for data and prices on brake lining, clutch facings, Ford Transmission lining, running board mats and packings.

Manufactured by

MIKESSELL BROTHERS COMPANY
156 No. La Salle St., Chicago, Illinois

Plant and Works, Wabash, Indiana



KESTER ACID CORE WIRE SOLDER



Radiator
Leaks

Gasoline
Tank

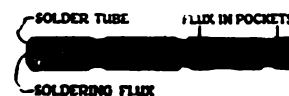
Battery
Terminals

Electrical
Connections

Carburetor
Connections

its uses
are many—
and its
results are
dandy

Whether it's a "tough" soldering job or just "mildly" difficult—whether it's to stop a radiator leak, solder an electrical connection, or what-not—it makes no difference to KESTER ACID-CORE WIRE SOLDER for it's



made to handle any soldering job easily and well! It's self-fluxing, you know. Just a little heat, just a little time, and a little KESTER ACID-CORE WIRE SOLDER—and you have a permanent mend. It "stands the test"—always. Use the coupon below and you'll be convinced!

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Am. Garage 6-22

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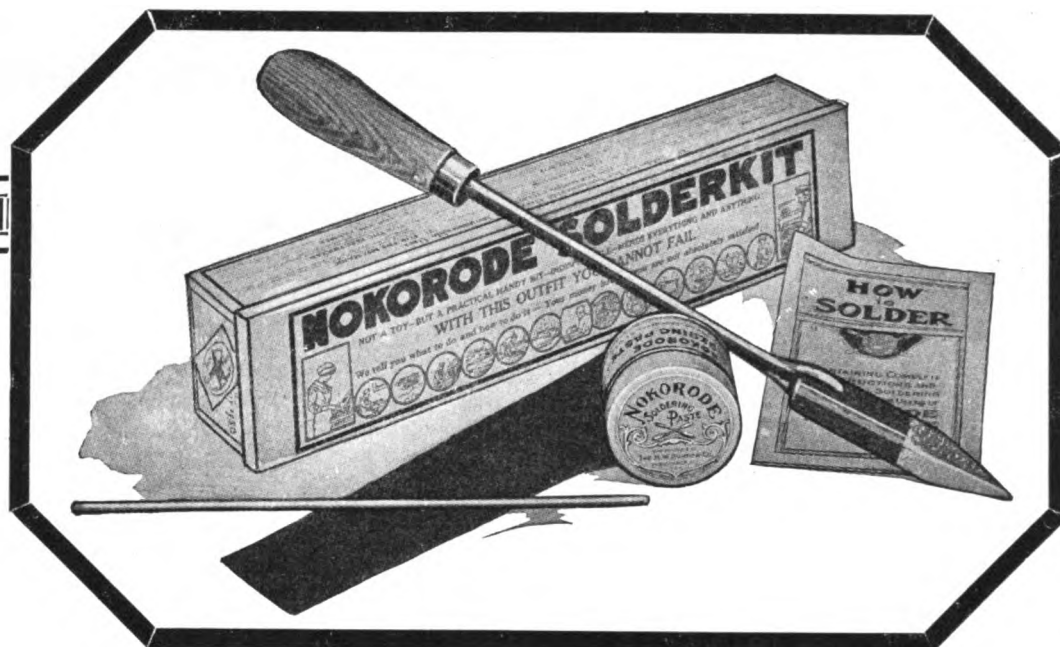
Company

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City

State

Our Supply House Is



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FOR YOU—FOR “MA”—AND THE BOY

You can all use a Nokorode Solderkit. You can use it—make all the minor repairs on a car—and find it handy to carry along when you “take to the road.”

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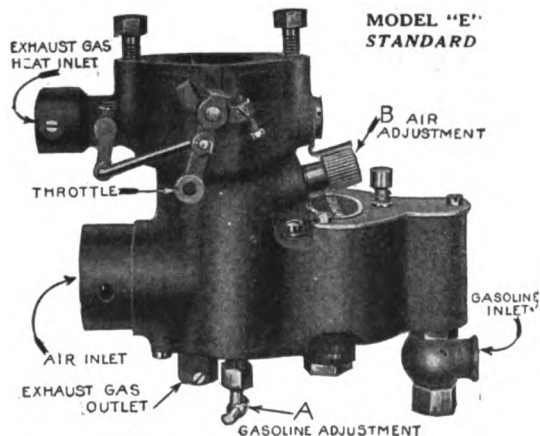
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CYLINDER REBORING MACHINES

World's Standard for Speed Accuracy and Reliability

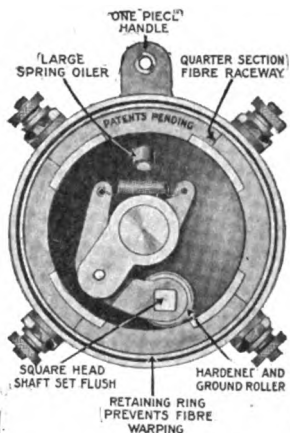
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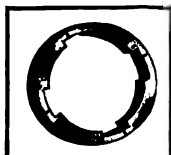
are OH KAY sellers because they are guaranteed. Note the substantial construction and it will be easy to understand why we have the largest individual factory specializing on timer manufacture.

On a solid ring fibre you get two of the wearing surfaces with the grain and two against the grain; this is one of the principal causes of a "humpy timer."

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A Better Timer to Time 'er Better
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It is a real Money Saver
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This labor-saving device will pay for itself many times in the shopmen having all tools and parts near the job. The bench is easily moved. Sturdy and well built throughout. Room for parts and tools—trays and compartments.

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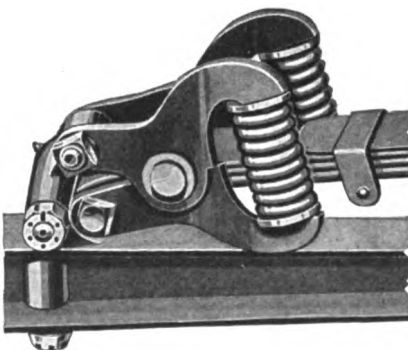


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Give the greatest flexibility and comfort on either a normal or full load. Do not affect spring mounting of Ford Car. Simplest and easiest to install—car owner can do it himself. The biggest shock absorber ever offered at the price—\$8.00 per set of four. Three styles—No. 1 for Runabouts, No. 2 for Touring, No. 3 for Sedans. **DEALERS—** Here's a real money maker. Write today for full data.



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**Audits, Investigations, Surveys, Systems
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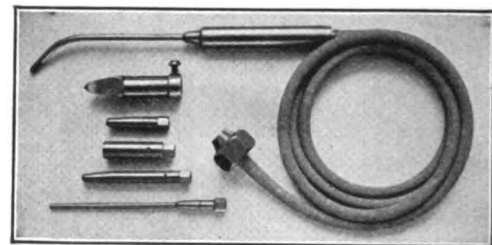
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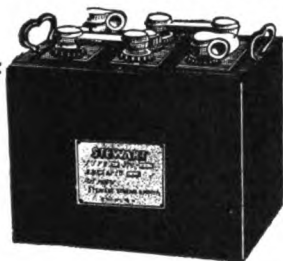
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The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

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Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

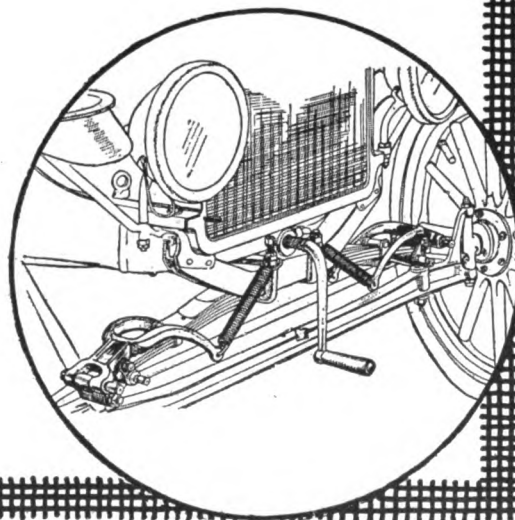
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

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DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

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"Service by the Golden Rule"

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EQUIPMENT)

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More Customers — Bigger Profits

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Auto Supplies, Tires, Tubes
Gasoline, Oil and Free Air

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PHONE 172

CYLINDER REGRINDING

Standard and Oversize

PISTONS

PISTON RINGS PISTON PINS
ALL WORK INSPECTED

With our **BU-NITE PISTONS**

Goes a **GUARANTEE**
of SATISFACTION

Standardized Prices
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Build your own test equipment from my thoroughly tested plans, and save hundreds of dollars. Complete plans and specifications for following articles postpaid upon receipt of price:—Test bench, \$1.50; Armature tester, \$1.00; Ignition tester for all systems, \$1.00; Magnet charger, 50c; High-rate discharger, 50c; Growler, 50c; Ford coil tester, 50c; Set of diagrams, showing interiors of nearly all coils, \$1.50; All of the above complete, \$8.00, including FREE CONSULTATION SERVICE FOR SIX MONTHS.

Satisfaction guaranteed.

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The simplicity of operation of "The York" cylinder boring machine, its rigidity, sturdiness and compactness, are just a few of the admirable features resulting from the high "quality" of York construction.

This portable machine tool will bore all motor blocks—passenger car, truck, tractor—within its capacity, $2\frac{1}{2}$ " to $5\frac{1}{16}$ ". Precision and accuracy are insured.

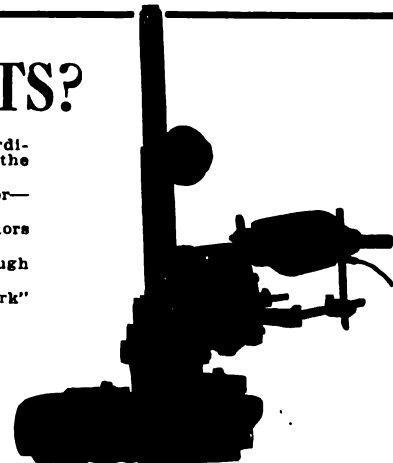
Gear driven throughout and operated by hand or power. Detachable Head Motors may be rebored in the chassis.

"The York" is packed in heavy oak case, with convenient compartments. Thorough instructions furnished.

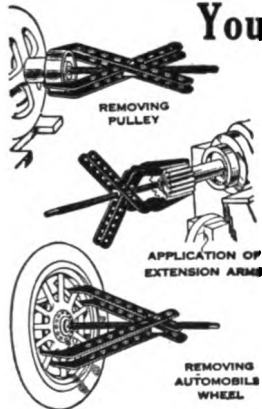
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You Need One or Both These Gear and Wheel Pullers



The "LITTLE GIANT"

pulls any gear, wheel or pulley—anywhere—in a jiffy. Built on the only correct principle—produces maximum efficiency with minimum effort. Can't twist off or let go. Made of best grade drop forge steel. Adjustable up to 13" diameter. Price complete with extension arms \$12. Satisfaction guaranteed or money refunded. Order one today or write for data.

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This heavy duty puller is designed to cover a range of work upward from where the "LITTLE GIANT" and other tools leave off. Weighs 100 lbs.—open adjustment 40". Pulls heavy motor truck and car wheels, ship and aeroplane propellers, heavy fly and gear wheels, transmissions, etc., easily. Can't slip off work—no arm locks required. Price complete with wrench and handle, \$50. Where you have a job no other puller will touch you need a "Big Buster."



"THE HARDER THE PULL—THE TIGHTER THE GRIP"

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**makes the handling of grease
SWIFT — CLEAN — EASY — SURE**

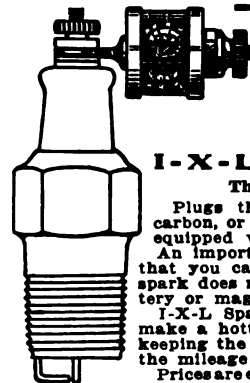
One man greases any differential or transmission in two or three minutes.

No grease is spilled on car, floor, hands or clothes. Delivers $\frac{1}{4}$ pound per stroke. Indicator shows amount used.

Sold on money back guarantee.

Y&P Co.

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First Aid to Motor Ignition

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I-X-L Spark Plug Intensifiers

They overcome spark plug troubles

Plugs that have become fouled with grease or carbon, or have broken porcelains fire perfectly when equipped with them.

An important advantage of the I-X-L Intensifier is that you can see the spark from any angle. If the spark does not show the motorist knows that the battery or magneto is not delivering the proper current.

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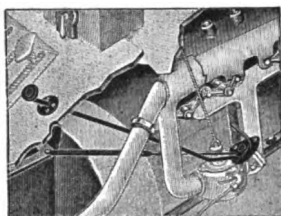
They are easily installed in a few moments time

Dealers and Jobbers—Write our sales dept. today for full details

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Price 75c

Sales Dept.
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Chicago, Illinois

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Increased demands from Culp-Plan associated stores constantly bring further automatic reductions in cost prices for Culp-Plan approved merchandise for the benefit of each and every Culp-Plan associated store.

Get Cost Bulletin No. 9 from

George K. Culp, Inc.
56 West 45th St. New York City

WATERVLIT SPIRAL EXPANSION REAMERS
They Will Not Chatter!

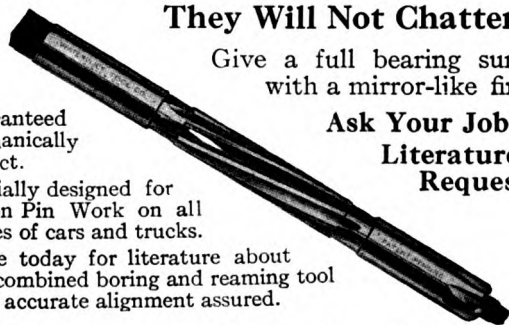
Guaranteed mechanically perfect.

Specially designed for Piston Pin Work on all makes of cars and trucks.

Write today for literature about this combined boring and reaming tool with accurate alignment assured.

Give a full bearing surface with a mirror-like finish.

Ask Your Jobber.
Literature on Request.



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INCREASE YOUR PROFITS BY MEETING THE DEMAND FOR THE ONLY MONEY GUARANTEED BURST PROOF REPLACEMENT RADIATOR FOR FORDS.

The Jaffe \$100.00 Reward Guarantee has a wonderful appeal for your customers. It is the greatest selling feature ever offered the trade. It means big JAFFE sales for you.

Write for the JAFFE Yellow Book and our new three-color display signs, imprinted with your own name and address.

Jaffe Radiator Co.
741-D W. Van Buren St.
CHICAGO, ILL.

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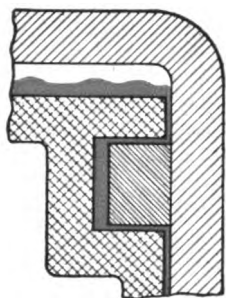
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Conventional and other multiple price rings leak oil around the groove.



Try this on any other ring!

Hold compression, keep spark plugs from fouling, keep oil out of the combustion chamber.

The spring against the ring does the work

3-A Piston Rings are so constructed that they will take care of cylinders at least .008 out of round, even when installed on aluminum pistoned motors, so that reboring is seldom necessary.

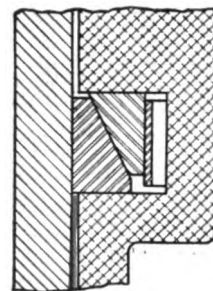
Write for Circular 25

Some territory still open

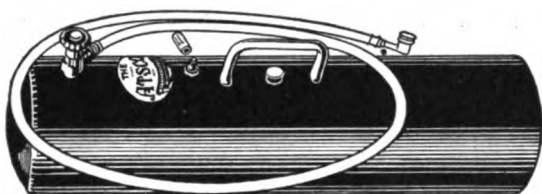
STEEL SPRING PISTON RING CO.

147 Metropolitan Ave.

BROOKLYN, N. Y.



3-A Piston Rings not only fill the groove, but have the same one-piece bearing surface as the conventional type ring.



You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

Pittsburgh, Pa.

YAGER'S

Trade Mark Registered

SOLDERING SALTS

for soldering all metals—just dissolve in water and the flux is ready. Harmless, quick-acting—just the thing for automobile repairs.

Buy it from your jobber in ½ lb., 1 lb., and 5 lb. cans.

New Prices for 1922.

ALEX. R. BENSON CO., Inc.
Hudson New York



V-Plex

Piston Rings

A Few Agencies Still Open

REPUTABLE mechanics know the value of side expanding rings. This statement is proven by our large business with repair dealers.

Over 90% of sales are repeat orders.

V-Plex rings embody many other special features of particu-

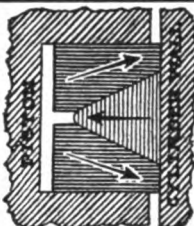
lar importance—may we explain them to you?

Exclusive county and sectional representatives for this remarkable, self-adjusting-to-wear-in-all-directions ring are being appointed. Possibly the agency for your district has not yet been assigned. Find out. Write now.

KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL.



You Don't Guess the Answer

You READ It on the Blade

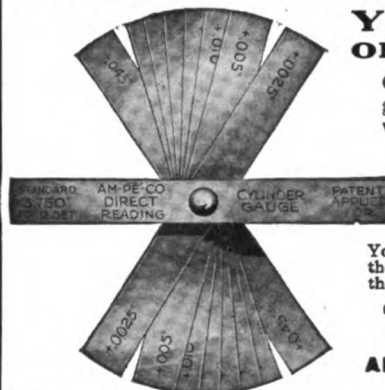
Cylinder measurements guaranteed accurate to within .00025" and less.

The AM-PE-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

Get the whole story in our circular. PRICE \$2.50

AM-PE-CO SALES CO.
Marshalltown, Iowa



The Carbon Remover That Increases Sales

A FAST-SELLING article, with an unusual repeat sale value, Motor-Kleen will build up your general sales by winning customers' good-will.

Containing no acids, alkalies or ether, Motor-Kleen is guaranteed not to injure the metal of the engine or interfere with lubrication.

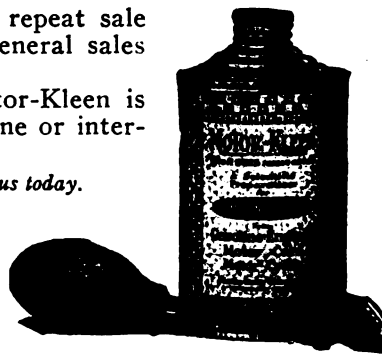
Full information will prove to your advantage. Write us today.

The Motor-Kleen Corporation

Factory and General Office:
Long Island City New York

MOTOR-KLEEN

TRADE MARK
The Scientific Carbon Remover



Pint can (will clean 16 cylinders)\$1.00

Spray (assuring correct measure and complete distribution within the cylinder)30

MOTOR-KLEEN CORPORATION, New York
Enclosed find \$..... for which
please send me..... cans of Motor-Kleen and \$.....
Name.....
Address.....
City..... State.....
A.C.A.D.-8

BUYERS' REFERENCE

AIR COMPRESSORS

Brunner Mfg. Co., Utica, N. Y.
Champion Pneumatic Machinery Co., 1402 E. Michigan Ave., Chicago.
Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

AIR HOISTS

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

AIR TANKS

Air Tight Steel Tank Co., Pittsburgh, Pa.

AMMETERS (POCKET and DASH)

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, Ohio.

ANTI RATTLES (Window)

Autoquip Mfg. Co., 495 W. St. Paul St., Rochester, N. Y.

AXLES (EMERGENCY)

H. G. Paro Co., 1410 S. Michigan Ave., Chicago.

BATTERIES

Stewart Storage Battery Co., Central Ave. at Sixth St., Marshfield, Wis.

BEARINGS

Western Bearings Co., 2831 S. State St., Chicago, Ill.

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Automotive Publ. Co., 448 S. Dearborn St., Chicago.

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Mikesell Bros. Co., 156 N. La Salle St., Chicago.

BUMPERS

Metal Stamping Co., Long Island City, N. Y.

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Albertson & Co., Sioux City, Iowa.

Rosier Howard Corp., Hutchinson, Kansas.

CARBON REMOVERS

Motor Kleen Corporation, Long Island City, N. Y.

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Marvel Carburetor Co., Flint, Mich.

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States Chemical Co., 680 W. Austin Ave., Chicago.

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Kennedy Car Liner & Bag Co., Shelbyville, Ind.

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Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

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Foster Bros. Mfg. Co., Utica, N. Y.

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Butler Mfg. Co., Indianapolis, Ind.

Storm Mfg. Co., Minneapolis, Minn.

Trindl Co., 2917 So. Wabash Ave., Chicago.

CYLINDER REGRINDING

Trindl Co., 2917 S. Wabash Ave., Chicago.

CYLINDER GAUGES

Am-pe-co Sales Co., Marshalltown, Iowa.

DISPLAY RACKS

W. L. Clark Co., 538 Pearl St., New York City.

DISTILLED WATER

Hinokley & Schmitt, Inc., Chicago, Ill.

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Sampson Electric Co., 2334 So. Wabash Ave., Chicago.

ELECTRIC FURNACES

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Continental Auto Parts Co., Columbus, Ind.

FAN BELTS

Hide, Leather & Belting Co., 229 S. Meridian St., Indianapolis, Ind.

FIRE FIGHTING EQUIPMENT

Flexlume Sign Co., Niagara St., Buffalo, N. Y.

GARAGE EQUIPMENT

Continental Auto Parts Co., Columbus, Ind.

H. G. Paro Co., 1410 S. Michigan Ave., Chicago.

Storm Mfg. Co., Minneapolis, Minn.

Watervliet Tool Co., Albany, N. Y.

Zinke Co., The, 1323 So. Michigan Ave., Chicago.

GASIFIERS

Pomeroy Electric Co., 48 E. Main St., Rochester, N. Y.

GASOLINE PUMPS AND TANKS

Wayne Oil Tank & Pump Co., Fort Wayne, Ind.

GEAR AND WHEEL FULLERS

Continental Auto Parts Co., Columbus, Ind.
Friss Mfg. Co., 3416 N. Illinois St., Indianapolis, Indiana.
Premier Electric Co., 2800 Ravenswood Ave., Chicago.

GLAROSCOPES

Hayden Ohlson Company, 47 W. 42nd St., New York City.

GREASE GUNS

Frank Rose Mfg. Co., Hastings, Neb.

H. G. Paro Co., 1410 So. Michigan Ave., Chicago.

GREASE PUMPS

Adkins, Young & Allen, 561 W. Washington St., Chicago.

H. G. Paro Co., 1410 Michigan Ave., Chicago.

HOOD SILENCERS

H. G. Jorgenson, Hampton Road, Erie, Pa.

LENSES

C. A. Shaler Co., 373 Fourth St., Waupun, Wisconsin.

LIGHTING WIRE ASSEMBLIES

Turner Mfg. Co., Kokomo, Ind.

MAGNETO METERS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

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Britton Auto Products Co., 119 W. 63rd St., New York City.

OIL GAUGES

Philip Schaefer & Co., 20 E. Jackson Blvd., Chicago, Ill.

OIL PUMPS AND TANKS

Wayne Tank & Pump Co., Fort Wayne, Ind.

American Oil Tank & Pump Co., Cincinnati, Ohio.

OILS AND LUBRICANTS

National Refining Co., 2003 Rose Bldg., Cleveland, Ohio.

Republic Products Co., Prospect Bldg., Cleveland, O.

PACKINGS

Mikesell Bros. Co., 156 N. La Salle St., Chicago.

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Am-pe-co Sales Co., Marshalltown, Iowa.

Trindl Co., 2917 So. Wabash Ave., Chicago.

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Burgess-Norton Mfg. Co., Geneva, Ill.

Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON RINGS

Butler Mfg. Co., Indianapolis, Ind.

Kraeborg Piston Ring Co., 536 Lake Shore Drive, Chicago.

Kendall Engineering Co., Fort Wayne, Ind.

Leesberg Machine & Mfg. Co., Fostoria, Ohio.

St. Louis Piston Ring Corp., 1807 So. Second St., St. Louis, Mo.

Steel Spring Piston Ring Co., 147 Metropolitan Ave., Brooklyn, N. Y.

Trindl Co., 2917 So. Wabash Ave., Chicago.

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Waglew Mfg. Co., 700 Manlius St., Syracuse, N. Y.

POLARITY INDICATORS

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Continental Auto Parts Co., Columbus, Ind.

PUMPS

Air-Tight Steel Tank Co., Pittsburgh, Pa.

Autoquip Mfg. Co., 495 W. St. Paul St., Rochester, N. Y.

Frank Rose Mfg. Co., Hastings, Neb.

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

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Jaffe Radiator Co., 741 W. Van Buren St., Chicago.

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Watervliet Tool Co., Albany, N. Y.

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Mikesell Bros. Co., 156 N. La Salle St., Chicago.

SHOCK ABSORBERS

Indiana Parts Co., Richmond, Ind.

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Philip H. Webber & Co., Hoopeston, Ill.

SIGNS

Federal Electric Co., 8700 State St., Chicago.

Flexlume Sign Co., 25 Kall St., Buffalo, N. Y.

SOLDER

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

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F. A. Albertus & Co., 206 9th St., Milwaukee, Wis.

Benson Co., A. R., Hudson, N. Y.

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

M. W. Dunton Co., The, Providence, R. I.

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M. W. Dunton Co., The, Providence, R. I.

SPARK PLUGS

Leich Electric Co., Genoa, Ill.

Allen Specialty Co., 2751 W. Lake St., Chicago, Ill.

SPARK PLUG INTENSIFIERS

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

SPRING OILERS

Compton Spring Oiler Co., 29 Broadway, New York.

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Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

Turner Mfg. Co., Kokomo, Ind.

SPRINGS

Garden City Spring Works, 2200 Archer Ave., Chicago.

New Era Spring and Specialty Co., Grand Rapids, Mich.

STORAGE BATTERY TESTERS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

TESTING INSTRUMENTS

Leich Electric Co., Genoa, Ill.

TIMERS

Dale Mfg. Co., 1223 S. Michigan Ave., Chicago.

Leich Electric Co., Genoa, Ill.

McCullough Mfg. Co., 216 High St., Boston, Mass.

Spad Mfg. Co., Inc., 42-B W. 38th St., New York City.

Turner Mfg. Co., Kokomo, Ind.

TIRES

Geo. K. Culp, Inc., 56 W. 45th St., New York.

Broadway Tire Jobbers, 250 W. 54th St., New York City.

Lincoln Tire & Rubber Co., 714 Prospect Ave., Cleveland, Ohio.

TIRE CARRIERS

International Stamping Co., 400 N. Leavitt St., Chicago, Ill.

TIRE REPAIR EQUIPMENT

Robt. M. Bowes Co., Indianapolis, Ind.

Atlas Auto Supply Co., 680 W. Austin Ave., Chicago, Ill.

C. A. Shaler Co., Waupun, Wis.

TORCHES

Turner Brass Works, Sycamore, Ill.

TROLLEYS

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

TRUSSES (FOR GARAGES)

Leo McDaniel Contracting and Engineering Co., Cairo, Ill.

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Broadway Tire Jobbers, 250 W. 54th St., New York City.

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Albertson & Co., Sioux City, Iowa.

Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.

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VALVE REFINING TOOLS

Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.

VALVE REMOVERS

Bufum Tool Co., Louisiana, Mo.

VOLTMETERS (POCKET and DASH)

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

VULCANIZERS

C. A. Shaler Co., 353 Fourth St., Waupun, Wis.

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WORK BENCHES (Portable)

Continental Auto Parts Co., Columbus, Ind.



Results tell the tale

A perfectly made piston ring, equally efficient for compression and oil trouble, with an oil-sealing, oil-controlling channel, the only one with outlets to release excess oil, preventing clogging. The "self-seating" surface fits itself to out-of-round cylinders. 3 rings are installed on each piston.

Pleased Owners and More Profits

In furnishing piston rings for replacement purposes, the greatest profits result from rendering entirely satisfactory service. For satisfied customers will spread the story of the treatment that pleases them, thus adding new customers to your list.

Garages, dealers and repair men everywhere are finding out more and more every day that TELL-TALE Rings invariably produce complete satisfaction.

There are three big reasons:

- 1—TELL-TALE Rings are oil sealing. The oil film retained in the oil channel seals in compression.
- 2—TELL-TALE Rings stop oil pumping. They have the only oil channel with outlets to prevent clogging and carbonizing.
- 3—TELL-TALE Rings are self-seating. They wear in to fit out-of-round cylinders in less than 100 miles of running.

75c since April 1—send for folder.



Additional profits may be made by catering to those owners who demand a more moderate-priced ring. The St. Louis KWIK-SEAT Piston Ring retails at 50c. Here is a splendid quality ring which has the same self-seating feature that has made the TELL-TALE Piston Ring so popular.

Write for Literature and Discounts.

Complete descriptive folders on both rings will be sent upon request. Address the factory or the nearest distributor listed below. Good discounts to dealers and repair shops. Also a very attractive Service Station proposition for responsible dealers who will carry a small assorted stock.

St. Louis Piston Ring Corp.

1816 N. 2nd St. St. Louis, Mo.

Chicago Sales Office: 2121 S. Michigan Ave.

Principal U. S. Distributors

Tell-Tale Piston Ring Sales Agency, 1512 Vine St., Philadelphia, Pa.
Acme Piston Ring Co., 2121 S. Michigan Ave., Chicago, Ill.
Bearings Specialty Co., 180 Massachusetts Ave., Boston, Mass.
Frank W. Wood Co., 70 West New York St., Indianapolis, Ind.
Lydney, Neal & Lydney, 3302 Bigelow Blvd., Pittsburgh, Pa.
The Standard Metal Goods Co., 2080 E. 30th St., Cleveland, Ohio
The Miller-Wiegand Co., 217 E. Main St., Dayton, Ohio
Canadian Distributors—The Standard Metal Goods Co., 170 King St., West, Toronto, Ontario, Canada

TELL-TALE

TRADE MARK

PISTON RINGS

Contact Every Time at the Right Time!

Positive contact at high or low speed—
Not affected by engine vibration—
No contact points to clean—
No rollers—
No fibre raceway—
No attention needed after installation—
Those are the special features of the

LEICH MAGNETIC TIMER

(For Fords and Fordsons)

Magnetic pull makes this Timer the most reliable and satisfactory.

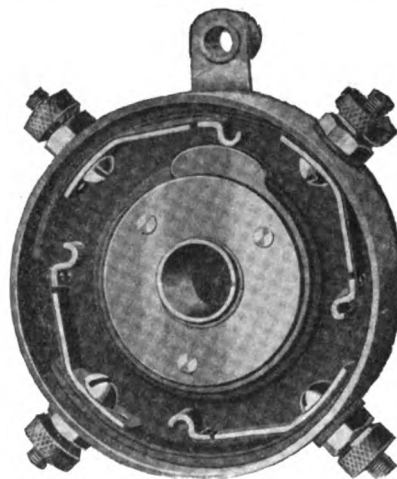
Dealers: Fill in the coupon below and get our special "30-day" trial offer.

LEICH ELECTRIC CO.

Manufacturers of RADD Spark Plugs

GENOA

ILLINOIS



LEICH ELECTRIC CO.

Genoa, Ill.

Please send data and prices on the Leich Magnetic Timer.

Name _____

Address _____



One Hand Washes the Other.

When You Sell A Spare Tire
You Make A Customer For A

2-R-3 TIRE CARRIER

When You Show A Motorist
A **2-R-3** TIRE CARRIER
You Create A Customer
For An Extra Spare
By Showing Him How To Carry It



Every Motorist
Carries a Spare Tire
Wise Ones
Carry . . . **2-R-3**

Made in Two Styles.
Both Dependable and in Every Way Satisfactory.
Just a matter of preference.
Both Easily Attached and Quickly Removed.



NEARLY every car is equipped for carrying one spare—few for carrying two, but the experienced motorist knows well the advisability of 2-R-3 spares, even for daily service.

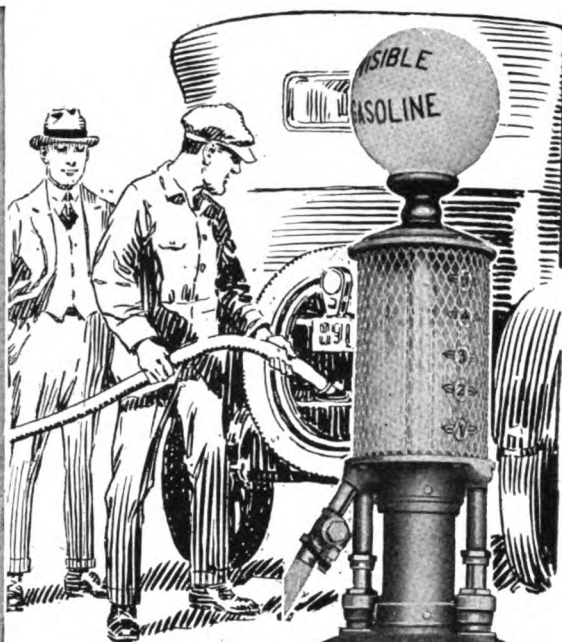
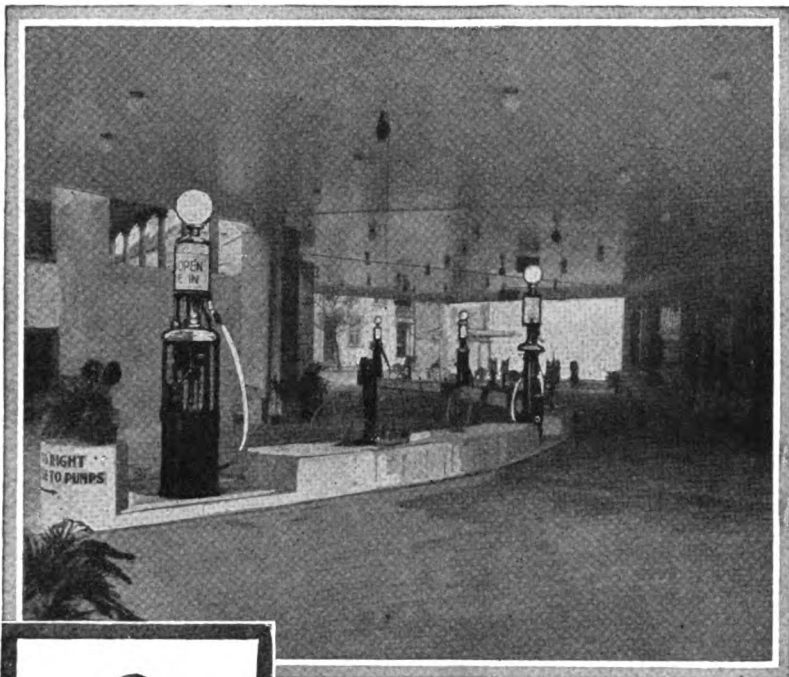
The 2-R-3 Carrier solves the problem of carrying that extra spare at little cost and with maximum convenience.

Sold to the trade through regular channels. *If your Jobber is not stocked, order direct and we will deliver through one who is.*

Send your order for a dozen or more today and give us the name and address of your Jobber, and we will send you by express prepaid our Silent Salesman display stand.

International Stamping Company
408 North Leavitt St., Chicago

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



The **FASTEST** *and* easiest to operate of any visible pump *on the market*

So says the United Company at Charleston, S.C., who are operating five American Visibles in their Calhoun Station. And before installing the American they had always operated BLIND pumps.

American *Visible Curb Pump*

The buyer of an American Visible is getting MORE than a pump. He is getting, first, the BEST PUMP SERVICE to be had and, second, a SALES ARGUMENT that ATTRACTS and APPEALS to every buyer of gasoline who believes in A SQUARE DEAL—who wants to SEE what he buys and KNOW that he GETS what he PAYS for.

The American Visible Pump is QUICK, SAFE and EFFICIENT.

ONLY 25 SECONDS are required to fill and drain the container.

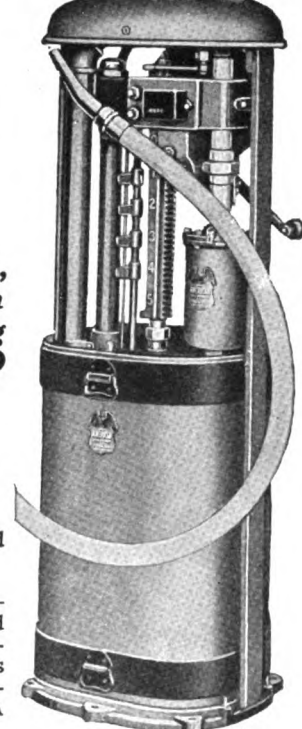
The pump is hand operated—avoiding frequent repairs and breakdowns. The gasoline is filtered and every gallon pumped is registered by accurate meter—furnished WITHOUT EXTRA CHARGE.

Write us for information, descriptive literature and prices.

The American Oil Pump *Land Tank Company*

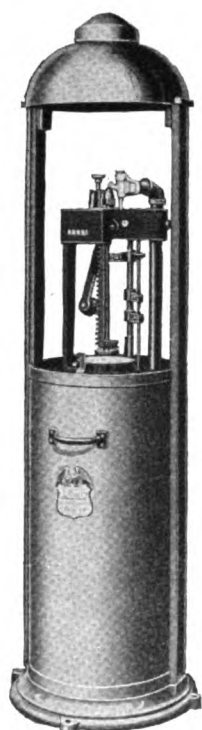
1161 Findlay Street, Cincinnati, Ohio

The "American" line includes a wide variety of gasoline outfits—both *visible* and *non-visible*, also lubricating oil, kerosene and paint oil equipment.



PUMP 204-V

Inspected and passed by the Underwriters' Laboratories and bears the Underwriter's Label.



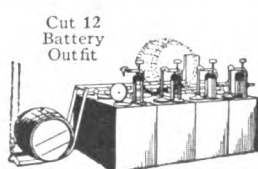
CUT 106
Lubricating
Oil Outfit
for Curb and
Filling Station



Model A
Pump with
Filter,
Meter, Etc.

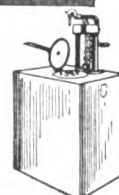


Cut 21
Portable
Gasoline
Outfit



Cut 12
Battery
Outfit

Cut 36
Lubri-
cating
Oil
Outfit



Cut 102
Curb
Pump

June Special!



**1-25 lb pail of
SPEE-DEE "Free"
with an order for one
case of Spee-Dee
(containing 36-27oz. Cans)**

Here's a pippin of an offer—a 25-pound pail of Spee-Dee—the wonder hand cleanser—free during the month of June—with the purchase of one case of Spee-Dee, containing 36 27-oz. cans.

What garageman, repairman, dealer—can afford to miss this “big opportunity?” Not a man! They all know Spee-Dee. They know how a teaspoonful of this creamy cleanser will rout the grease and grime from the hands. They know how handy Spee-Dee is when there's no water available and a fellow has just finished making repairs on a car. They know Spee-Dee is absolutely harmless to the skin.

Just follow that arrow that curves down in the corner—fill in the coupon right away. When you invest in Spee-Dee you always get your money's worth. Invest in Spee-Dee in June and you'll get your money's worth—with interest.

STATES CHEMICAL CO.

680 W. Austin Ave.

CHICAGO, ILL.



States Chemical Co., 680 W. Austin Ave., Chicago, Ill.

Gentlemen: Send me one case of Spee-Dee (containing 36 27-oz. cans) with which it is understood I am to receive—free of charge—1 25-lb. pail of Spee-Dee. Attached find remittance for \$7.20.

JUNE SPECIAL COUPON

Name.....

Address.....

Name of Jobber.....

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

JULY, 1922

Vol. 13—No. 7.
10 Cents the Copy.
\$1.00 Per Year.

SHALER ROADLIGHTER GIVES THE BEST DRIVING LIGHT

THE SHALER ROADLIGHTER is the only headlight lens which has received the maximum candle power rating in every State where tests have been made under the standard specifications of the Illuminating Engineering Society.

It is the *only headlight lens* that may be used with maximum candle-power bulbs—and comply with the law, because *it stops all glare*. Many makes of lenses are prohibited except with low candlepower bulbs, which only give a weak light, and even then the headlights must be tilted down. Almost any lens may be "legal" under these restricted conditions of use—but mere legality means nothing when compared to the proved efficiency of the Shaler Roadlighter.

The Shaler gives a better driving light because the waste or glare rays are bent down and focused on the edges of the road, not scattered or fanned out, as with other deflecting lenses. The distant light is more intense than with plain glass. The road is smoothly lighted to full width—with spotlight intensity on the edges, which protects the user against the glaring headlights he meets and the danger of accidents.

Write for Free Book "*Making Light of Glare*" which contains a summary of the Standard Headlight Law, and gives detailed information about Shaler Roadlighters.

Sold by All Reliable Jobbers

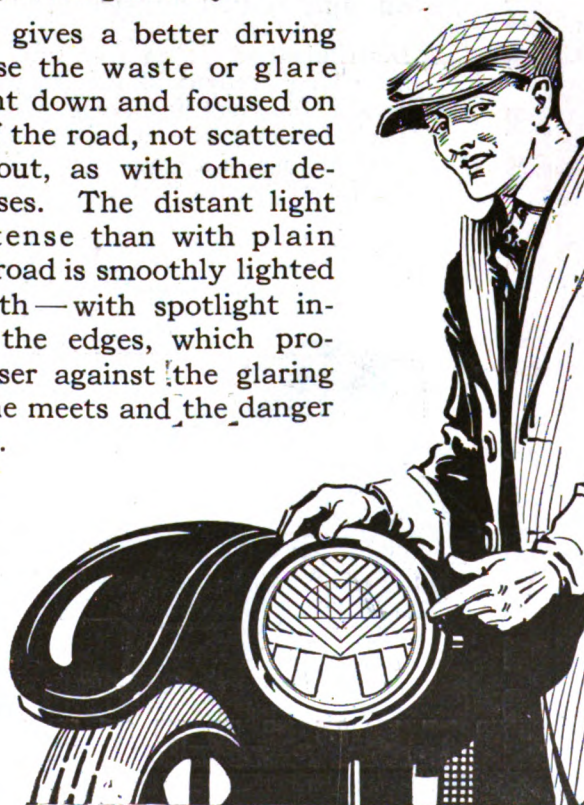
8 $\frac{1}{4}$ inch and smaller (Ford size) . . . \$2.75 a pair

8 $\frac{3}{8}$ inch and larger \$3.50 a pair

Prices slightly higher west of Denver and in Canada

C. A. SHALER COMPANY

356 Fourth Street, Waupun, Wisconsin



NEW FACTORY of the
CHAMPION PNEUMATIC MACHINERY CO.

Located at 8164-66-68 S. Chicago Ave., Chicago

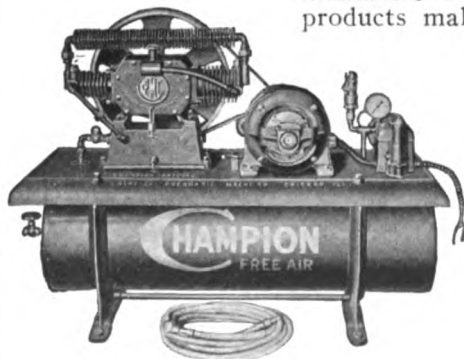


“PROGRESS”

Surely there is no more forceful symbol of the progress of an organization and the popularity of its products than the building which houses it!

Discriminating garagemen and service station owners **everywhere** have long recognized the superior workmanship and the **excellent** results obtained from the performance of Champion Equipment. Their insistant and ever-increasing demands for “more” have made the building of a great new plant, with facilities “looking far into the future,” a necessity.

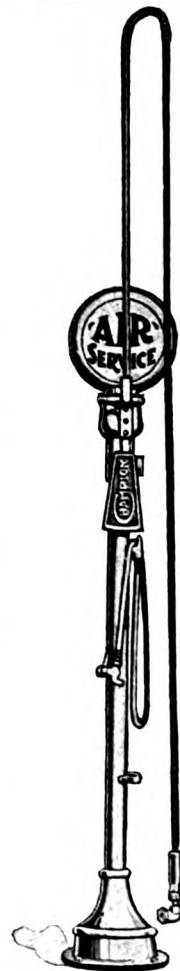
In this modern plant are manufactured Champion two-stage compressors—efficient and durable—compressors that “never wear out,” air and water stands strikingly handsome in appearance — invaluable in the scope of their service. These products make the name of Champion a byword of quality among garagemen who know.



If you would have an establishment whose air service is **incomparable**, let us send you details on Champion Equipment—now.

**Champion Pneumatic Machinery
Company**

8164-66-68 S. Chicago Ave., Chicago





The Story of Patches

IN
FOUR
INSTALLMENTS

Part 1

THE TREAD PULLER

It stands out prominently in the midst of the shop equipment—a handsome, sturdy “masterpiece of machinery.”

“Here it is,” says the “go-getter” repairman who owns it, “my pal, the Progressive Tread Puller. Now you’ve ‘met’ one reason why my patches fit the casings and why I can make them at one-tenth the price I had to pay for stiff and flat ‘readymades.’ Boy! Don’t those readymade patches cost! \$1.50 to \$2.25 each. Since I’ve grown ‘wise’ in the game I just take an old junk casing, and remove the tread and one or more plies of fabric with my pal, the Tread Puller. It’s easy. Cords are handled easily, too!”

Two sets of rolls, working in opposite directions separate the parts of the casing. The gear ratio gives all the strength needed and with two levers I keep the work under **perfect** control. For a clean-cut job—this first step in the life of a patch—the Progressive absolutely and positively can’t be beat!

I have three other pieces of Progressive machinery—a bead cutter, patch trimmer and fabric skiver. How much for the four? \$121.50. You can buy them singly, but I bought the group on easy payments. Didn’t miss the money. And say boy! the work they do do!”

(To be continued)

THE P. S. M. COMPANY

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Minneapolis, Minn.





F R M Timer

For the Ford
Car-Truck-Tractor

**30 DAYS FREE
TRIAL OFFER**

Put and F. R. M. Timer on your car and use it for 30 days; if you are not perfectly satisfied in every way return it to your dealer and get your money back.

Every F. R. M. Timer is guaranteed for one year against defects in material or workmanship.

F. R. M. Mfg. Co.
Fairbury, Illinois.

A New Brain for The Ford Motor

Jobbers and dealers everywhere are tying up with this new Ford timer because it gives the customer 100% service at a reasonable price. There is nothing else like it—it puts pep into troublesome motors, multiplies gas mileage and ends all spark plug troubles.

Get this name firmly fixed in your mind

F R M Timer

**It fires from high compression to the extreme
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The big idea is the long firing period. Starting at high compression the F. R. M. keeps a hot spark in the cylinder until the piston reaches the extreme end of the stroke. The oil that usually settles on the plugs is entirely burned away. One user hasn't cleaned a plug in his taxi since February. Great reports are coming in from everywhere. If you are interested in giving your customers the best; if you want to sell a timer that gives you a neat profit and a satisfied customer on every sale get in touch with us today.

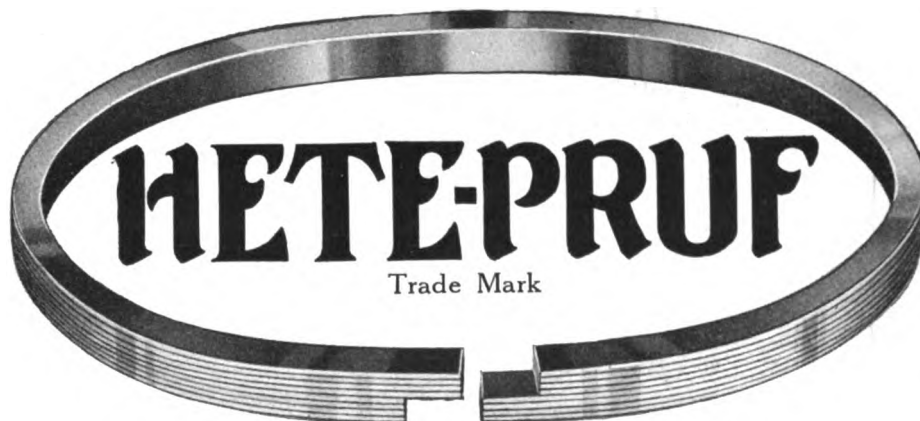
Die-cast shell; Bakelite insulator; cold rolled steel contact plates, true to 1/2 of one-thousandth; extra heavy phosphor bronze brush that sits the race at a 45° angle under oil tempered spring control; all wires, including light wires, enclosed in oil and damp proof cable. It runs with or without oil, the brush being the only wearing part. It's easy to see its merits. We guarantee it and stand behind the dealer.

F R M Manufacturing Co.

Fairbury, Illinois

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It Is Heat—Not Wear—That Spoils a Piston Ring



STEEL BLUE PISTON RINGS

Are Unaffected by Any Heat Action up to 700° Fahrenheit—300° Hotter Than They Will Ever Get in a Motor

To every automotive engineer it is a fundamental fact that it is heat, not wear, that spoils a piston ring. Piston Rings do not wear out, they warp, lose their tension and often break, thus causing leakage and loss of power, solely as a result of heat.

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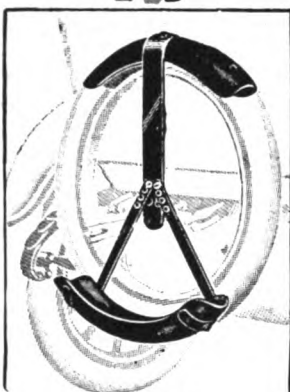
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During "Dog Days" 2-R-3 Carrier Sales Soar



Model Y

Comes disassembled. Easily put together with wrench.

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| 3½ in. \$4.50 | 4 in. \$5.00 |
| 4½ in. \$5.50 | 5 in. \$6.00 |
| 5½ in. \$7.00 | |

FOR it's then that the motorist wants plenty of spares for his cross-country trips—

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Model S

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| | |
|---------------|--------------|
| 3½ in. \$2.50 | 4 in. \$3.00 |
| 4½ in. \$3.50 | 5 in. \$4.00 |

International Stamping Co.
408 North Leavitt Street
Chicago

2-R-3

SPARE TIRE CARRIER

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, *Editor*

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AMERICAN GARAGE & AUTO DEALER, Inc.

116 South Michigan Avenue, CHICAGO

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Owners Everywhere Approve

Let owners of Wayne Pumps from coast to coast and from Canada to Mexico and the Gulf tell you what they think of Wayne Pumps. Their opinions are unbiased. They say what they think. And what they think is worthy of your consideration.

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K. W. Grant, who operates a filling station on the main-traveled highway between New York and Albany, likes his Wayne Pump because it meets the first requirement of the busy East—speed in service.

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Down in Dixie, where integrity is inbred, Wayne Pumps are accepted for their accuracy. R. C. Blanchard, of DeFuniak Springs, Fla., writes: "The government inspector said the Wayne Pump was the best on the market. I have a Wayne and another pump. I notice that ninety-five per cent of the people stop at the Wayne."

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nooga declares: "The gauge on my Wayne Pump is absolutely accurate and it stays so."

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Martel Brothers, Burlingame, Cal., find that their Wayne Pump "never gets out of order and today is in as perfect condition as it was the day it was installed."

The proprietor of the Thousand Pines Garage, San Bernardino, Cal., does not think that "there is any better pump made even at higher prices."

Wouldn't you like to know more about the pump which satisfies those who buy it as the Wayne does? Write and ask for Bulletin 276-AGD

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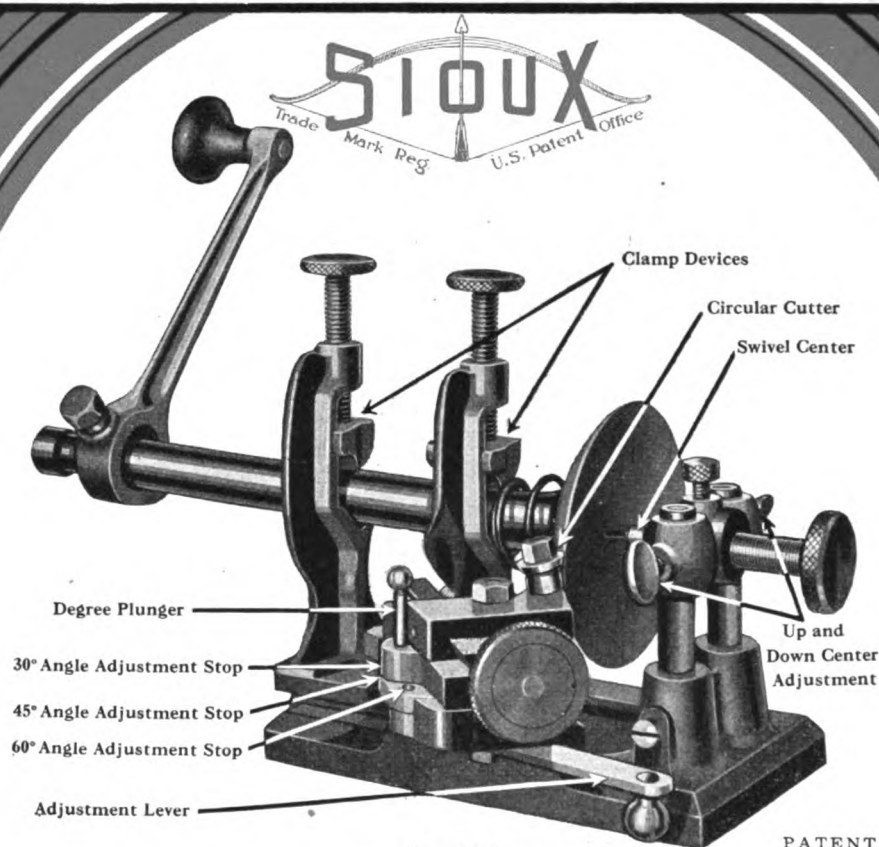
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No. 600

PATENTED:
Feb. 17, 1914
Nov. 26, 1918
Others pending

Refaces Valves with Accuracy and Speed

Takes care of small jobs as well as the large. Refaces valves from $1\frac{3}{8}$ " to $4\frac{1}{2}$ " with either a 30, 45 or 60 degree angle.

The Sioux Valve Lathe is simplicity itself. No tedious adjustments. So simple a novice can operate it. More accurate than a machine lathe.

Cutter can not get out of line. Round cutter insures smooth face on any steel or cast iron valve, without shattering or leaving ridges and gives unlimited cutting edge—will outlast ten ordinary cutters. Valve is self-centering in lathe. Clamps hold valve in alignment. All adjustments accurately and permanently built into tools. Fully equipped with proper springs for handling all sizes of valves. Has two cranks—one for small and one for large

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SIoux SERVICE keeps cutter sharp at no cost to you but carrying charges. When cutters get dull, send them prepaid and direct to us, including return postage, and they will be sharpened and returned the same day received. We maintain a special department for this service. Be sure you get **SIoux TOOLS** if you want **SIoux SERVICE**.

All Live Jobbers Handle Them

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SIoux CITY, IOWA

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small-Town
Automotive Trade"

Vol. XIII. No. 7.

CHICAGO

JULY, 1922

Building Personality and Leadership

What Are the Fundamental Elements of Personality and Leadership in Business?—Practical Analysis of Them and How They May Be Developed by Ambitious Persons—Address Before the Chicago Association of Commerce

By Dr. J. M. Fitzgerald

The subject of "Personality and Leadership in Business" is a very large one. It is entirely too large to more than touch some of the fundamentals and to hit some of the highest points.

The word "personality" has come to mean in the minds of some people something external, a peculiar physical appearance, a quality of magnetism that consciously or unconsciously influences all those who come in contact with such a person. Some men have taken this as its meaning and, having made mistakes because they have failed to estimate the inner personality of men, have discarded the term.

Now you business men—you men of the advertising profession and sales managers and salesmen—know very well the power of personality. You know the power of the personalities of the various men whose business you seek—that is, you seek to serve them in a special way, and you never would make the mistake of estimating wrongly the personalities of great men after you have had one or two conferences with them. They impress you with an indelible feeling and thought and purpose that "here is a man I cannot forget."

You know the magic of words. There is everything in a name. Shakespeare's name has lasted for more than 300 years, and today, more than at any time in the past, creates the profoundest respect upon its mention.

Personality has a broad significance. We can divide it into three segments:

A good personality is a wonderful asset to any person regardless of their vocation or avocation—and because automobile men and garagemen continuously come into contact with the personal element in their work, the cultivation of personality is most desirable.

The other day the editor heard an address on "How to Develop Personality and Leadership in Business," which strongly impressed him as containing some mighty valuable thoughts for automobile people—ideas which they can use in their everyday business relations and contacts. And in these days of individual competitive efforts, the development of ideas into action is frequently the turning point between personal failure and success.

So a copy of the address which was delivered by a man who has spent some 25 years in the direct study of human nature and of the faculties in people which make for success when properly developed, and failure when unguided and unrestrained, was secured for presentation to the readers of the AMERICAN GARAGE & AUTO DEALER.

It's worth reading carefully several times and then careful pondering as to what ideas can be individually applied by each reader in the development and improvement of business personality and leadership in his community.

The physical, the mental, and the spiritual.

By the *physical* personality we mean what we can see of a man as to his age, his height, his health, his weight, the athletic tone of his muscles, and his posture.

By his *mental* personality we mean those qualities which we call training, his education, his sense of humor, his capacity to respond to certain demands made upon him, and the character and force of his thinking or the lack of all these qualities.

By his *spiritual* personality we mean his affection, his sympathy, his interest in others, his enthusiasm for good, his capacity to take and carry out conscientiously, responsibility.

When a man is ill, he feels lowered in tone of body and in health. Suppose he calls a physician: If the physician he consults is not one who is running an ambulance service but is doing something for prevention of ill health, he tries to discover the cause of the disability or the illness of the patient.

If the symptoms are severe and painful and distressing, he endeavors to alleviate these—but he diligently seeks for the cause and tries to arouse his patient to the consciousness of carrying out his advice, his counsel. But the power to respond to the physician's advice and counsel, and recover his lost health, lies wholly within the patient. The medicine that he is given is a temporary thing, much as a crutch is in the case of a broken leg.

The power of recovery is largely within the man. Whether he will return to his previous normal health will depend upon his physical, his mental, and spiritual resources; how much depth of affection he has for his family, or for those working with him or for him; how much moral responsibility he feels in the conduct of his business; how much he desires to succeed and carry out the thing he has undertaken. All of these are of immense importance in the recovery of that man.

So, too, the failures that we make

in life—the failures that we make in business—are largely fundamentally inherent in the individual. That is to say, lack of education, lack of perception, understanding of himself, some weakness in his character, some physical disability or weakness, something deficient in his temperament, or an

honor upon him. During this period he conducted all of these businesses. Further than that he delivered 100 to 150 addresses a year.

This man began his task after he was 61 years old—and in the course of his period of governorship he had gained 35 pounds in weight; he was stronger physically and mentally than he had been before he undertook all of these varied duties.

He told the same citizens that Dr. Lowell had addressed that he believed there was not one in the audience who had developed more than 25 per cent of his natural mental and physical endowment. He said: "If Dr. Fitzgerald were to analyze me and set aside his

friendship for me, I doubt whether he would say I had developed more than 25 per cent of my brain power."

Now, I am pointing out to you the *need*, the *opportunity*, and the *capacity* for leadership in business. Where there is no stable business, there is no stable government, no enlightenment. This, then, is a challenge to your intelligence, to your capacity, and to your energy, that you seek to study yourselves, for the man who fails must find within himself the remedy to overcome his weakness, to change it, to make adaptations.

The most notable quality of human nature is our adaptiveness, our capacity to make readjustments. We are all having splendid opportunity for readjusting during these times.

The *physical* personality impresses us immensely, profoundly—I might say, instinctively. Psychologists tell us that we are impressed and pleased far more by curved line things than we are by straight line things.

They have not told us why this is so, but it seems to me that it is because our first happy impressions formed in this life are related to curved line instruments. Our first meal was thus obtained. Our bowl and spoon, plate, cup and saucer, and knife and fork appeal to us repeatedly; the boy's ball, bat, and top make a deep appeal to him; the girl's doll with

its curls and its dresses with their ruffles and flounces appeal to her; the roses, the flowers, the trees, the leaves, the birds, and the thousand and one things about us of a pleasurable nature of the curved line form appeal to us.

Now, we find that this applies to human nature. If a man be built upon the curved line plan, he should cultivate the faculties of firmness, self-confidence, conscientiousness or honesty of intention, continuity, and combativeness, so that these qualities radiate in his face, they compress his lips, they square his chin to his life and to his duties.

They give him strength of character, of body, of legs, and a strong hand—all that are indicative of a fixed purpose and of direct, intelligent action.

The curved lines dispel fear and make him attractive to people. These qualities manifest themselves in his voice, in his handshake, in his walk, in his mannerism, and make such a man impressive.

I have in mind a man whom you all recognize as the highest type of this organization, our late President Theodore Roosevelt. Here we have the dynamic personality coupled up with a pleasing and social-minded man.

We know in what a poor way physically he was when he left Harvard—he was a nonentity so far as his personality was concerned—but he developed his physical personality so that he might have the energy, the power,



Surely the Time is Coming When We Are Going to Examine Into the Causes for Failures.

imbalance in his personality, are the causes for those failures.

More than 40 per cent of the failures in business are due to men's inefficiency and misdirected selections of their vocations or due to faulty education for their business. This should challenge the strong, clean-cut, high-thinking type of business man.

How can we have a stable, uniform, progressive society and nation with such a large defect in business? Surely the time is coming when we are going to examine into the causes for failures. We are going to do something for the prevention of business failure and not be running a business ambulance service.

Dr. Lowell, president of Harvard University, a magnificent combination of scholar and business executive, told a large gathering of people about a year ago that the ancient nations all died from a lack of leaders. Roger W. Babson has stated that less than 2 per cent of the American people control and direct the destiny of America.

Former Governor Ferris of Michigan, who 35 years ago went up to Big Rapids, Mich., and started a school of four students, has developed a college, the largest one of its kind in Michigan, of over 4,000 students a year. He has, as president of a bank, safely and practically conducted it, managed a farm successfully, was a member of the board of directors of a number of organizations during the period of his governorship, which covered two terms, and conducted that office in a manner that has reflected credit and



You Have These Two Types Before You So That You May Study These Qualities and Make the Most of Your Dominant Possibilities and Powers.

the capacity to endure and do the work which he did.

If a person be built upon the straight line plan, he should cultivate friendliness, courtesy, pleasantness, agreeableness, tactfulness, and a sincere interest in the other fellow's well-being as

well as his own. I have in mind a man who embodies these qualities—President Harding.

He possesses something of the mien and appearance of Washington without, of course, the military training or character. He has cultivated all of the social amenities of attractiveness, of friendliness, of the care of his neighbor, of the interest in the citizenship of his state.

You have these two types before you, so that you may study these qualities and make the most of your dominant possibilities and powers and at the same time keep in mind your weakest qualities for, as "a chain is no stronger than its weakest link," so, too, man is no stronger than his weakest quality.

A defect of personality, whether it be mental, physical, or spiritual, must be looked after, carefully studied—and if a trait or quality is over-developed, it must be repressed. Education is a question of repressing the animal instincts and making them good servants, for they are very poor masters. A man must analyze himself, so to speak, by looking for his mental freckles and not being over-infatuated with his mental dimples.

In my contact with many thousands of men and women, I have tried to adduce certain dominant qualities and attributes as they were given to me that make for leadership and success. I should expect that anyone who cultivated these qualities would greatly advance his interest and increase his ability. These qualities are: First, en-



The Mind Grows Exactly as Does the Body—Upon What One Feeds Each and Upon Their Exercise and Use.

ergy; second, sincerity; third, knowledge; fourth, enthusiasm; fifth, self-confidence; sixth, friendship; and seventh, continuity of purpose.

Energy.

William James, in his essay on "The Energies of Men," tells us of the three levels of energy which men possess,

but which are rarely brought into complete use in a normal way. Men who achieve great success in any line of endeavor that is complex and which involves much thought and responsibility, have been able to connect up these levels of energy, so that they were able to work at either a high rate of speed or to control the process of their thinking and work over a long period of time without bankrupting their health.

The energy may not be physical—it may be mental, it may be spiritual, or social. You can see how a man may develop his personality in this direction if he wants to—most people wish. You know a "wish" is a baby, a "desire" is a 16-year-old youth, and "want" is a full-grown adult. Are you a "want"?

Where we organize our wishes into desire and our desires into wants, we have a moving force. As we want food, shelter, clothing, rest, social comforts, we move to satisfy these. Most men could, if they wished sufficiently, develop the desire into a want.

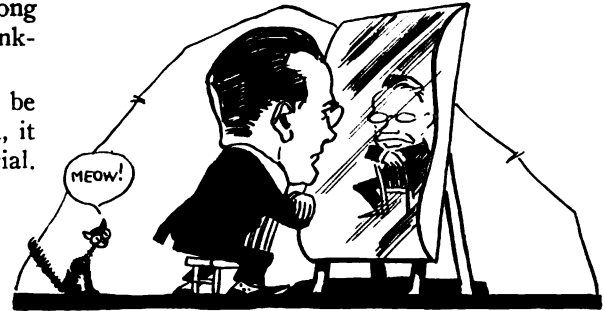
President Roosevelt was a notable example of a man who built up a dynamic, magnetic, and impressive personality from what appeared to be a very modest physical endowment. The average person merely wishes that they had such a personality—they do not want it, or they would try to develop it.

It is clear to the medical man, who studies the human being from the point of view of the highest potency of health and energy, that large lungs, other things being equal, are a sure sign of great physical strength. This is indicated in the chest of the soldier, and in the size and form of the lungs of the lion. The latter's strength is a combination of his lungs, his broad brain, jaw, and powerfully-built body.

Roosevelt stated that he took one hour of exercise each day involving all of the muscles of his body, particularly exercising the upper part of the body, with which is associated the initiative physical courage and dynamic will. Imagine the loss to the nation had Roosevelt's habits been indolent, care-

less, or at best his giving only five to ten minutes each morning to the invigoration of his body and to the high purpose of doing a full man's job throughout the day.

Sandow has said, "Five minutes of purposeful and I-want-to activity is of far more importance than an hour of I-have-to, or desultory activity. The



It Would Be 15 Minutes Well Spent Each Day to Ask Yourself: "Where Have I Failed Today?"

former is will-developing; the latter muscle-developing."

I believe in the extension of golf clubs and the multiplication of gymnasiums rather than the multiplication of tombstones and the extension of cemeteries. Proper habits of exercising and of selection of the right kind of food would add 20 to 40 per cent efficiency to thousands of men who otherwise are striving manfully to do the best that they can. It would increase the length of their life, 10, 20, or 30 years over what it would be without a proper consideration of these factors.

Sincerity.

Carlyle says that a deep, full, profound sincerity is the first characteristic of a person in any wise noble or heroic.

Sincerity means seriousness of attitude towards one's life and life's work. It means something more than truth and honesty in the ordinary acceptance of these terms. It means that each person is trying to do his or her best in the work in which they find themselves occupied; that they are seriously and honestly trying to help their firm to succeed, and through this effort to help their family succeed, thus making their contribution to the community.

Sincerity means that honesty is not a policy; it is a principle and, therefore, never at a discount in any instance where honest people meet and have dealings with each other. Even a crook wants an honest pal—wants him to be honest and truthful with

him, though he is dishonest to the rest of the world. This is an anomaly that cannot hold true very long between such insincere persons.

Knowledge.

Knowledge is power, as is evident by the electric lights in this room, in the proper management of this hotel, in the intelligent conduct of the various businesses of this city, in the hundreds of laboratories throughout the country in which new ideas and processes are being developed, and in the thousands of trains that are traversing the country and carrying on the work of civilization.

In all of the activities about us we see that there is no substitute for knowledge. Though a few persons may substitute bluff for knowledge to intimidate the weak and to confound the uninformed and ignorant, in turn bluff intimidates the bluffer and confounds him, because he is certain of meeting persons who clearly analyze his desires and show him how futile they are.

Abraham Lincoln said: "I shall prepare my mind, and perhaps my time will come." Here is a high manifestation of energy, sincerity, and intelligence. He did not say, as some are wont to do: "Prove to me that the securing of an education through employing my spare hours, denying myself social pleasures and ease, will be of high value in helping me to earn a good living and place myself in a distinguished position, and I shall, therefore, undergo the training."

The human brain cannot be constantly loaded up with irrelevant and trashy stuff and develop vigorous thinking ability of a high order. No! the mind grows exactly as does the body—upon what one feeds each, and upon their exercise and use.

Herbert Spencer said: "You cannot expect golden sentiments to flow from leaden instincts." The business leader must read business first, while his mind is fresh and his brain is capable of responding to the demands that he makes upon it. In this respect, at least, the mind is much like a teapot—one will pour out what one pours in.

James Farrell of the United States Steel Corporation typifies the high-minded, successful business man, in my judgment, when he says: "I do not know a great deal about many things—in fact, I make no pretensions—but about the things that are necessary to the conduct of my business I

hope to know all I can, and few men know more about their business than I know about my business."

We are studying too many "isms" and things that disassociate the mind. We do not get down to the study of business, and the first problem of business is to understand human nature, that we may be able to adapt our thought and words to the other persons' thoughts and mode of expressing themselves.

Enthusiasm.

Enthusiasm is but the natural outgrowth of the qualities mentioned in the foregoing. Real, deep, genuine en-

Education.

Every man has two educations—that which is given him, and that which he gives himself. Of the two kinds, the latter is by far the most valuable. Indeed, all that is most worthy in a man, he must work out and conquer for himself. It is that that constitutes our real and best nourishment. What we are merely taught seldom nourishes the mind like that which we teach ourselves.—Richter.

thusiasm is the very breath of success. It is to one's occupation what air is to life—a vitalizing, stimulating, growing manifestation of life itself at a high tide.

Notable examples of enthusiasm can be recalled to the mind of every person. We find one of the most unusual examples of enthusiasm in the person of Lloyd George who has carried his program through in every activity that he has undertaken, except in respect to the Irish question. Here he met enthusiasm that completely overcame him. The recent affair in England in which Lloyd George came out triumphant bespeaks the enthusiasm of the man who carries everything before him.

Self-Confidence.

Self-confidence is the natural outgrowth and sequence of all of these qualities just discussed. Former President Taft said a little while ago that many young lawyers had a logical reason for not being self-confident in law. The fact was, they knew very little law.

James J. Hill, in my opinion, furnishes one of the grandest examples of the growth of self-confidence of all men of our time. His biographer tells us that he lost the sight of an eye as a young man, and that prevented him

from taking up medicine as he planned.

He intended to go to the Orient and start something worth while, but he did not have enough money to pay his passage. He thought he would make his way to Canada, but he was snowed in at St. Paul.

You know his subsequent history. He did not cry that fate was against him and that circumstances were a barrier to his progress, but rather he had this to say about himself:

"I never had a great deal of respect for the over-cocksure type of man. I have seen so many of them fail. True, I never had an excess of self-confidence; I always kept in mind the possibility of failure, and tried to so think, plan, and work as to prevent failure from occurring."

He sold his services and his work on a lowered market for 25 years, but we know how triumphantly he succeeded.

Friendship.

Friendship is the cement that binds individuals and society together. It is the civilizing ferment. Any man who cultivates sincerity of friendship is a civilizing influence and asset. A man may live without a brother or a sister, but he cannot live without a friend and be normal.

The conference recently held in Washington, where representatives of various nations assembled for the purpose of lopping off some of the savage national fears and substituting a friendly holiday, is an effort made in the right direction. Keep in mind what Pat said to Mike regarding friendship: "Sure, Mike, if you want friends, do not be backward in going forward to meet people and show them that you are friendly."

Continuity of Purpose.

Thousands of people spend half their life in changing around from one thing to another, trying to find what they are going to do with the other half of their life. They learn a little of too many things which cannot be correlated into a useful and definite purpose as effective instruments in their life and society any more than a piano key, a door knob, and a hammer may be correlated for constructive function.

Most persons who have succeeded in achieving a high success have developed continuity of purpose, or what is commonly called "stick-to-it-iveness," though some may have been

(Concluded on page 18.)

Gives 'Em "Monthly Tip" on Service

Motorists Like the Unique Advertising Folder Michigan Firm Calls "Our Monthly Tip"—Folder Brings in More Business and Assists in Giving Efficient Service—"Drive Thru" Construction of Service Station Also Effective

By Charles H. Smith

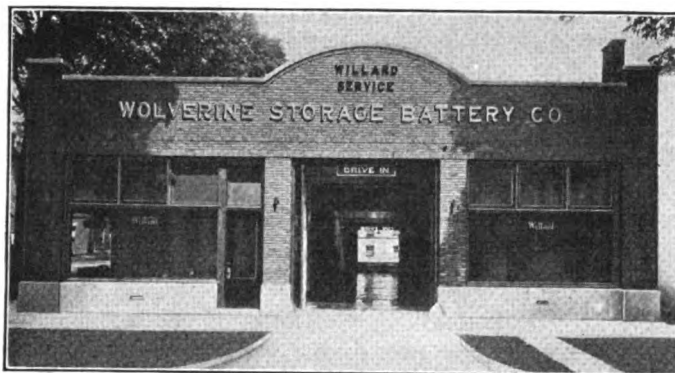
The Wolverine Storage Battery Co., located at La Grave and Oak Sts., Grand Rapids, Mich., which operates a battery service station and handles various accessories, has recently inaugurated an unusual method of advertising its modern place of business and the efficient service which is offered automobile owners.

This consists of the distribution by mail to the automobile owners of the city and surrounding rural district of a card entitled: "Our Monthly Tip." The card is $5\frac{1}{2}$ ins. by $10\frac{1}{2}$ ins. in size and is of stiff, calendered bristol board, light tan in color. This is perforated across twice, making it possible to separate the three sections easily and also to fold it so that it will pass through the mails easily. When folded twice, the size is that of a standard-size envelope, $3\frac{1}{2}$ ins. by $5\frac{1}{2}$ ins. Under a postal permit, it is mailed for one cent.

The purpose of "Our Monthly Tip" is of a double nature. First, it is used to get more business; second, it assists the company in giving and the customer in getting efficient service.

"Our Monthly Tip" is really a "tip" for, on the first inside cover it contains a "Special 'Get-Acquainted' Coupon" which is good for one-half dollar on the holder's next battery bill, up to and including the first of the month following the coupon's issue. The offer reads:

"This coupon is good for one-half dollar's worth of Houser-Craig Careful Service if



"Most Convenient Station in Town"—Wolverine Storage Battery Co., Grand Rapids, Mich.

Presented at Their Model 'Drive-Thru' Service Station, at LaGrave and Oak Sts., the Handsomest and most Convenient Station in Town."

This offer is printed on the coupon, which is perforated around its edges to assist in easily detaching it. Below the coupon is the explanation of the offer:

"We believe Houser-Craig Careful Service is the kind you have been looking for, and we think, once you try it, you will thank us for telling you so.

Accordingly, we're going to make it easy for both old and new friends to 'get acquainted.'

A thorough examination of your battery now will save you trouble the rest of the year. Bring it in, with the coupon above, before May 1st, 1922,

and let's get acquainted!"

Another of the inside sections contains a brief list of some of the accessories which the company handles—rheostats, cigar lighters, motor lubricants, etc., with a pithy description of each. The firm handles battery and motor accessories principally.

In addition to these business-getting features, on the back cover is a good reproduction of the firm's place of business, showing clearly that motorists may "drive thru" from one street to another.

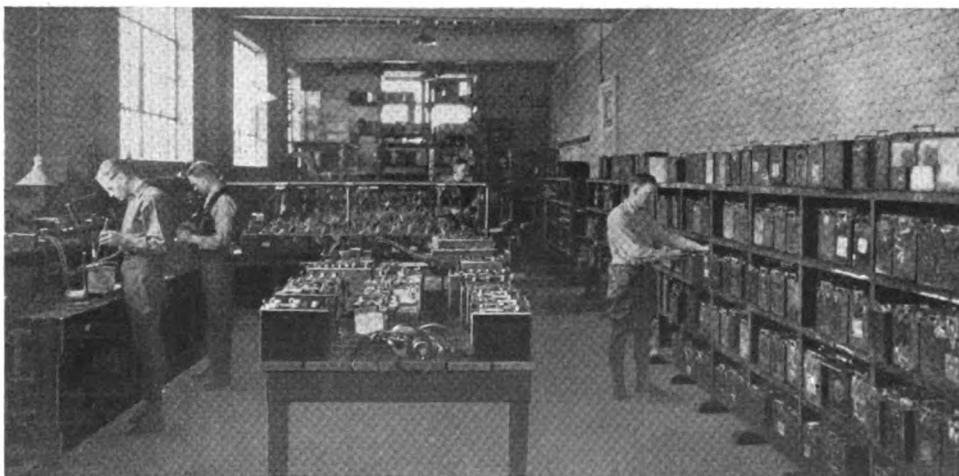
"Here," says the company, "you will find every facility for maintaining your battery always in the highest state of efficiency. Our repairshops are equipped with every mechanical convenience, the work is performed by experts, and you will find our large 'drive-thru' testing floor and prompt, courteous treatment a genuine satisfaction."

Thus, the company features its service and, as an added inducement, offers its "tip" coupon in seeking new business. This forms an attractive combination for most motorists.

There is still one more appeal, however, and this is one which has to do with enabling the company to give

efficient service, and assists the motorist to help the company in doing so. This is a list of instructions contained on the inside middle section of the folder.

Notice that, for certain service, there is no charge—and that the company mentions this fact plainly in the folder.



"Our Repairshops Are Equipped With Every Mechanical Convenience," Says Wolverine Storage Battery Co., of Grand Rapids, Mich.

Registration. If you have just received your new car, you should have the battery immediately registered. This must be done within five days after delivery. Go to the service window for your card. There is no charge.

Recharging. If your battery is "down" and should be recharged, kindly sign your order for the work at the service window.

Examination. Should your battery be inoperative and require special attention, inquire at the service window for technical man.

Release. When your battery has been fully repaired, you will be notified by mail. Kindly bring your notification card and claim check to the service window and obtain release.

Information. Since the number of batteries on hand is usually quite large, it will help us to give you prompt information regarding your battery if you will give us your name

and claim check number when you telephone or inquire personally regarding it. Thousands of patrons tested Houser-Craig Careful Service last season—and we expect many more this coming year. Our handsome and commodious "drive-thru" station is always at your personal disposal. Expert advice and personal attention are always free and courteous. If the floor is crowded, we ask you to be patient and await your turn. We welcome your thoughtful criticism and suggestions.

The section of the card containing these instructions has a hole at the top with the suggestion "pin up" beside it. A monthly calendar occupies the reverse side.

Dealers selling other lines of goods have pronounced the weekly or monthly distribution of publications containing their advertisements the

"best business-getters ever tried," and there is no reason why the accessory dealer cannot adapt this idea to his business with equal success.

Rightly handled, the monthly publication may be made to produce a large increase in business and—if used in the manner described in the foregoing instance—will enable the accessory dealer to handle a larger volume of business by instructing patrons, in the proper way, to make use of the service offered.

The cost of such a publication need not be great. In most vicinities a card similar to the one described can probably be obtained in quantities for about three cents each. When folded the cards may be held together by a stamp or a small wire clip.

Why not feature your service by sending out cards on the rural routes centering at your town?

Records For the Small Service Station

Some Practical and Simplified Forms Which Have Been Successfully Used in Small Service Stations For Recording Business Transactions—Purpose of Each Form Discussed and Proper Method of Making the Various Entries

By K. H. Lansing

For the small service station which, for instance, does not employ more than three or four men, the forms used successfully by the Packard Motor Car Co., of Detroit, Mich., for simplified practice, offer some remarkably good suggestions. These forms, numbering a dozen, are as follows:

Service inspection and estimate report

Check-in and check-out sheet

Repair order form

Service accounting and labor summary (reverse of repair order form)

Repair order envelope

Requisition

Requisition for credit

Time summary sheet

Daily register

Repair order recapitulation sheet

Operation record card

Owner's record card.

Explaining these forms in the order mentioned, we have the following:

A service inspection and estimate report which has four main functions:

1. As a report from the sales department to the serv-

SERVICE INSPECTION & ESTIMATE REPORT

15

Packard

Customer's Name: *N. J. Baylark*
 Address: *173 State Street*
 City: *Amherst* State: *Ill.*
 Phone No.: *722*
 Delivery Instructions: *Will call*
 Terms: *C.O.D.* Approved by: *H. J. M.*

R.O. No. *105*
 Customer Order No. *715*
 Est. Delivery *7/21*
 Completed *18*
 Delivered *18*

License No. *24 6126* Model-Body *2-35* Motor No. *126833* Date Original Delivery *6/23/21* Total Miles *17851*

CUSTOMER'S INSTRUCTIONS

*Oil change
 Change gasoline mileage only 6 M.P.H.
 Air pressure check left
 Speedometer out of order
 Oil and grease all over (quoted \$5 plus 1.25)*

NOTE: IN ORDERING REPAIRS, INDICATE THE TYPE OF WORK ORDERED

| ITEMS | QTY | Unit Price | Work recommended—by Speech | Est. Price | Actual Price | Balance Due |
|--------------------|-----|------------|----------------------------|------------|--------------|-------------|
| 1. MAJOR REPAIRS | | | | | | |
| 2. MINOR REPAIRS | | | | | | |
| 3. MAJOR REPAIRS | | | | | | |
| 4. MINOR REPAIRS | | | | | | |
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| 98. MINOR REPAIRS | | | | | | |
| 99. MAJOR REPAIRS | | | | | | |
| 100. MINOR REPAIRS | | | | | | |

This Form Used Only When Work Is Extensive Enough to Require Detailed Inspection or Estimate.

ice inspector as to the general terms of the work required.

2. It is the inspector's report of the work which he recommends to be done.

3. It is used for compiling the maximum estimate of the charges for work recommended by the inspector.

4. It serves as a permanent record of these negotiations. This form is used only when the work is extensive enough to require either a detailed inspection or a detailed estimate.

In filling out this form, entries should be made on the following plan: The customer's name, address and telephone number must be entered so that his copy of the repair order, which is mailed to him, will not fail to reach its destination. The customer's instructions as to place and method of delivery should also be secured, to avoid misunderstanding.

It is especially important

that the concern and the customer have a definite understanding, at the time the car is brought in for repairs, as to what the terms for these repairs

The blank for the customer's order number is filled in only in case a written order with a number is the authority for the work. The date and time

received must be carefully noted.

The entry for the estimated date of delivery should be filled in for each job but, before this is done, certain important factors must be considered. These include the parts to be used, length of time required to get them, present amount of work in the shop, and how close the co-operation of the sales department and the shop foreman may be made.

Customers should be informed when there is any considerable uncertainty of delivery conditions and they should be induced, as far as possible, to bring their cars in when the shop is not rushed.

Entries on "time completed" and "time delivered" can not be filled in, of course, at the time the order is written, but should be entered at the time the car is delivered, as a matter of record.

The license number should always be put on the order, as an aid to the man

in the shop in locating the car. Model and motor number entries are also essential for proper identification. The date of the original delivery of the car to the customer should be obtained from him in every case, particularly if "no charge" work is to be considered.

Total mileage may be taken from the speedometer, but the customer should be asked what is the total mileage, as the speedometer may not have recorded accurately.

All work which the customer might consider necessary should be put on the inspection report. Then, if this work is recommended and the customer decides not to have it done, the fact is apparent at any time that the inspection report form is referred to after the completion of the work. But it is necessary to avoid going to the opposite extreme and reporting repairs unnecessarily, as this takes much time and may give the customer a bad impression of the service he is receiving from his car.

When the inspector receives the inspection and estimate report, he checks it over carefully to make sure he understands the instructions and then proceeds to fill out the rest of the form. The items in the column at the left are arranged in logical order and, while not complete, this arrangement is a valuable mechanical check.

In the next column the heading, "Operation number," will be noted. The Packard company divided and grouped standardized operation into ten named classifications in logical sequence, for the sake of convenience

24
Packard
SERVICE DEPARTMENT

CHECK IN AND CHECK OUT SHEET

CUSTOMER: *H. J. Gaylord*
ADDRESS: *Carboro, Ill.*

CAR IN FOR: () REPAIRS () PAINT () TUNE () WASH () NEW () USED

MODEL: *3-25* MOTOR NO: *126823* BODY NO: *7-2nd* LOCKER NO: *131* R. O. NO: *108*

| FRONT | In | Out | REMARKS | LEFT SIDE | In | Out | REMARKS |
|-----------------------|----|-----|---------|-----------------------|----|-----|---------|
| Engine | | | | Engine | | | |
| Ignition | | | | Ignition | | | |
| Light | | | | Light | | | |
| Brake | | | | Brake | | | |
| Steering | | | | Steering | | | |
| Shock absorber | | | | Shock absorber | | | |
| Leaf spring | | | | Leaf spring | | | |
| Frame | | | | Frame | | | |
| Body | | | | Body | | | |
| Paint | | | | Paint | | | |
| Wash | | | | Wash | | | |
| Wax | | | | Wax | | | |
| Oil | | | | Oil | | | |
| Water | | | | Water | | | |
| Washers | | | | Washers | | | |
| Brake shoes | | | | Brake shoes | | | |
| Brake drums | | | | Brake drums | | | |
| Brake pads | | | | Brake pads | | | |
| Brake lines | | | | Brake lines | | | |
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| Brake slave cylinder | | | | Brake slave cylinder | | | |
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| Brake seal | | | | Brake seal | | | |
| Brake pinion | | | | Brake pinion | | | |
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| Brake arm | | | | Brake arm | | | |
| Brake drum | | | | Brake drum | | | |
| Brake shoe | | | | Brake shoe | | | |
| Brake pad | | | | Brake pad | | | |
| Brake line | | | | Brake line | | | |
| Brake hose | | | | Brake hose | | | |
| Brake master cylinder | | | | Brake master cylinder | | | |
| Brake slave cylinder | | | | Brake slave cylinder | | | |
| Brake adjuster | | | | Brake adjuster | | | |
| Brake spring | | | | Brake spring | | | |
| Brake pin | | | | Brake pin | | | |
| Brake nut | | | | Brake nut | | | |
| Brake bolt | | | | Brake bolt | | | |
| Brake washer | | | | Brake washer | | | |
| Brake seal | | | | Brake seal | | | |
| Brake pinion | | | | Brake pinion | | | |
| Brake gear | | | | Brake gear | | | |
| Brake shaft | | | | Brake shaft | | | |
| Brake yoke | | | | Brake yoke | | | |
| Brake arm | | | | Brake arm | | | |
| Brake drum | | | | Brake drum | | | |
| Brake shoe | | | | Brake shoe | | | |
| Brake pad | | | | Brake pad | | | |
| Brake line | | | | Brake line | | | |
| Brake hose | | | | Brake hose | | | |
| Brake master cylinder | | | | Brake master cylinder | | | |
| Brake slave cylinder | | | | Brake slave cylinder | | | |
| Brake adjuster | | | | Brake adjuster | | | |
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| Brake washer | | | | Brake washer | | | |
| Brake seal | | | | Brake seal | | | |
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| Brake master cylinder | | | | Brake master cylinder | | | |
| Brake slave cylinder | | | | Brake slave cylinder | | | |
| Brake adjuster | | | | Brake adjuster | | | |
| Brake spring | | | | Brake spring | | | |
| Brake pin | | | | Brake pin | | | |
| Brake nut | | | | Brake nut | | | |
| Brake bolt | | | | Brake bolt | | | |
| Brake washer | | | | Brake washer | | | |
| Brake seal | | | | Brake seal | | | |

and to avoid confusion. These were numbered as follows:

0. Inspection.
1. Lubrication.
2. Wash and polish.
3. Major motor repair.
4. Clutch and transmission.
5. Running gear.
6. Front axle and steering.
7. Electrical.
8. Equipment.
9. Body top and miscellaneous.

Each of these main headings is subdivided into ten, or less subheadings by means of decimals. For instance, the main heading—motor repairs—is subdivided into:

- 3.1. Motor—general repairs
- 3.2. Cylinders, pistons, pins and bushings
- 3.3. Cooling system.

Again, each one of these has been subdivided into more specific operations by the addition of another decimal place. Thus, the fan being a part of the cooling system, we have a "2" with a "3.3," which represents the cooling system, and have the number "3.32" to cover the fan. In this way, any item or part of the car can be subdivided as much as desired to obtain the necessary detailed item in its proper place.

The operation schedule has been divided into three separate groups, each making use of the decimal classification as in the foregoing, but with the following distinction:

1. Inspection operations denoted by an "O" in front of each number.
2. Detail operations, which have no prefix.
3. Combination operations, denoted by the prefix "C."

Inspection operations and detail operations are used chiefly for general overhaul jobs, or heavy repairs, while ordinary repairwork is taken care of by means of the combination operations.

Detail operations are used largely by the repairshop foreman in recommending specific work on jobs coming to the shop for inspection. Combination operations are made use of more frequently than the other schedules, calling for all of the work entailing tearing down and building up.

In the column under "Operation Number," in the service and inspection report, the proper operation number should be filled in opposite the proper item.

When the estimator gets the form to estimate the price, the detail of estimating is not done in the customer's

presence. The total amount of expense for each item must be placed in the proper column—whether charge or no charge—and in this amount must be included labor at the standard rate as well as the list price of all parts to be supplied.

The purpose of the form called "check-in and check-out sheet" is to check all parts, material and equipment on a car when it is brought in and when it leaves and to see that these two sets of entries tally, thereby avoiding complaint from the customer. This form gives a complete record of the parts, material and equipment. Sometimes it is well to fill in "Remarks," to obviate a complaint, such as might occur in a case where a seat cover is soiled when the car first comes in, or where the top is torn or a tool handle missing.

The order to have a "check-in" made is a verbal one and the checker or inspector is responsible for filling out and returning the form. The checker puts an "O. K." in the column headed "In," covering all special equipment. The items are grouped so they may be checked easily as the checker walks around the car.

Conditions of tires and casings also are checked.

This form is made out in duplicate. The original is put in the envelope with the shop office copy of the repair order form so that, in case of any question during the time the car is in the shop as to what equipment belongs with it, the shop foreman can readily refer to the shop order. The duplicate copy goes to the sales department.

When the job is completed, the copy which has gone with the car must be used for checking out, the checker putting check marks in the "Out" column corresponding to those in the "In" column, and the form must be signed by the person who checks it out. The copy is then returned to the sales department.

In order to minimize the labor necessary to keep account of the exact equipment on a car or truck, the use of a seal for the tool box and other lock compartments is recommended. Steel lockers may also be used and some dealers have large duffel bags in which all equipment for each car is placed by number and the entrance locked with an automatic seal like that on mail bags.


In case of frequent complaints from a customer about missing equipment, it is best to make an extra copy of the manifest form and mail it to the owner with the repair order copy.

After the car has been inspected, the estimate report form filled out and the estimate computed, the repair order form must be filled out—preferably on

When the workman starts on the job, time must be noted in the space opposite the word "On" on the back of the repair order, and his number and the item of the order on which he is working must be recorded in the proper column. When the workman leaves off work, or finishes his job, his time must be noted in the space opposite the word "Off" and the number of hours may be reckoned and filled in, in the "Hours" column. By using

(Concluded on page 18.)

| Quantity | | Part No. | NAME | Cost | Sale Price |
|----------|----------|----------|-----------------|------|------------|
| Wanted | Supplied | | | | |
| 1 | 1 | 60198 | Gas Tank Gasket | 04 | 05 |
| 12 | 12 | 48280 | Clutch Liners | 4 60 | 6 00 |
| 100 | 100 | 56862 | Rivets | 16 | 20 |
| 1 | 1 | 74390 | Speedom. Shaft | 6 00 | 8 50 |
| | | TOTAL | | | |

| | | | | | |
|--------------------------------------|--|---|---|------------------------|----------------------------|
| Filled by <i>R. L.</i> | |  | REQUISITION ORIGINAL | | No. |
| Priced by <i>✓</i> | | | Original and Copy to be turned in for parts supplied. Original to be priced and forwarded for billing. | | Charge to R. O. <i>105</i> |
| Factory Order No. <i>✓</i> | | Date Ordered <i>✓</i> | 19 | Date Received <i>✓</i> | 19 |
| Order made out by <i>D. J. M.</i> | | O. K'D <i>M. P. B.</i> | Received by <i>Riley</i> | Checked by | |

Requisition Form to Be Used When Material Is Taken From Stock.



PENLINGS FROM THE PEN OF DIKE.

Pay For 'Em as You Use 'Em McCrary.

I was down in Fort Worth, Tex., the other day, and while reading a newspaper I noticed that "Pay For 'Em as You Use 'Em McCrary" spoke at a bankers' banquet. I wondered who the fellow was. I knew that he was a prominent man, for you have to be prominent before a large daily newspaper will call you by a nickname.

My curiosity was aroused, so I went out and questioned a street merchant—better known as a newsboy, and they are real merchants. Why, if a lot of the merchants knew as much about merchandising as a newsboy, they would double their sales. I questioned: "Who is the guy around here that they call 'Pay For 'Em as You Use 'Em McCrary?'"

A look of disgust came over his face. "Why, don't you know that guy? He's the guy what sells all those cord tires on credit. You don't live here, for everyone knows HIM!"

I started right out to find his store—and it did not take me long to find it. Soon I was face-to-face with the man they all knew, and the way he was opening letters and taking out checks made me ashamed of myself for not knowing about him.

As soon as I got an interview, I asked him his plan, and he said: "Every mail brings letters asking for my plan and I am glad to tell you."

I said, "Shoot!" And here is the way:

"When I decided to go into the tire business," said McCrary, "I had one ambition, and that was to be known as a tire merchant—not just as a tire dealer but as a merchant of high-grade merchandise. I interested W. E. Connell, president of the First National Bank of this city, to go into my company as president.

"I told him that all car owners wanted to ride on good tires, but the reason some of them didn't was that all did not have the money to invest in high-grade cord tires—that, if given a chance to buy them on the installment plan, they would all buy them.

"He laughed at the idea. I ordered quite a lot of Coronada cord tires and told them that I intended to sell them on the installment plan. They laughed and said: 'You've gone crazy.'

"Finally, I overcame my partners' objections and placed a small advertisement in the paper, telling the trade that I would sell cord tires at one-third down, balance 30-60-90 days, 'Pay For 'Em as You Use 'Em.' The first week I sold \$3,000 worth. I decided to stop and wait for the payments to come due before selling many more at those terms.

"Before the 90 days were up, I had collected every cent on that \$3,000 worth of tires. Then I knew my plan, if rightly presented, would work, so I purchased a page in the Fort Worth Star Telegram, paying \$600 for a three-color page advertisement—and on the following Monday I sold \$3,000 worth of tires on one day.

"Today my income from installments is over \$100 daily. I have the slogan 'Pay For 'Em as You Use 'Em' copyrighted. Today I have \$40,000 on my books and not a statement that is past due.

"How do I protect myself? First, by selling only high-grade cord tires that will give satisfactory service and that are absolutely 'Firsts.'

"Second, I take a mortgage on tires, which the customer pays me 31 cents to have recorded. I charge 10 per cent interest.

"Then I have a set of three collection letters and I mail these to any one who does not pay on the day the payment is due.

"I advertise in the daily papers. I personally guarantee every tire and tube, and if one does not prove satisfactory, I replace it and do not argue with the customer.

"I have now extended my plan all over the state of Texas, and have dealers who sell my tires and I take paper in payment. Our president says that, in all his years of banking, he has never seen as good collections as we have."

As I sat and listened to this, I saw him unloading a car of tires and, as I noticed the cars passing along equipped with Coronada cord tires and remembered that he had sold over \$100,000 worth in the past year, I said to myself:

"Dike, no wonder the newspapers call him 'Pay For 'Em as You Use 'Em McCrary.'"

Engineering Lockout Settled in Great Britain.

Advices received at the U. S. Department of Commerce would indicate that a considerable amount of business will be lost for this season by the British motor industry because of the 11-week engineering lockout which ended in June by the acceptance of the employer's proposals by the various labor unions.

Manufacturers state that many prospective purchasers have withheld their orders for the year and that other large orders have gone to makers in the United States, Italy and Germany. Certain makers are well stocked with chasses. The Rolls-Royce and several other large plants were forced to shut down in early May.

RECORDS FOR THE SMALL STATION.

(Concluded from page 16.)

a typewriter—using a single line for each operation and making any special notations in connection with each item.

Authority for performing the work and supplying parts must be obtained from the owner of the car or his accredited representative. If authority to go ahead with the work is received by telephone, letter or telegram, the recipient must sign for the owner and sign his own name, as well as noting by what authority. The repair order should then be placed in an envelope having a celluloid, or other transparent face, and hung up on the car.

BUILDING PERSONALITY AND LEADERSHIP.

(Concluded from page 12.)

many years developing their mind and personality. Thus their point of advantage seemed delayed, but their achievement justified their ever-patient effort.

Many people are on the right track—but they fail simply because they do not analyze their deficiencies. They do not try to discover within themselves what is weak and wherein their latent talents lie; they do not analyze themselves. I believe it would be 15 minutes well spent for every young man here—and perhaps some of the older ones—if they would devote that time at the close of each day in quiet contemplation with themselves and ask themselves seriously and honestly, "Where have I failed today?" not, "Where have I succeeded?"

Study the causes of the failure, try to remedy them and thus improve conditions for yourself and fellowmen.

Real Service Plus Real Selling

Just Two Girls Yet They Operate a Service Station Which Probably Does More Business Than Any Other Station in Their Locality—Businesslike Methods of Service, Selling and Publicity Are Responsible For Success

By C. A. Goddard

What service, backed up with real selling methods, will do is evidenced by the experience of the proprietors of Jean and Marion's Service Station, 4117 Pasadena Ave., on the outskirts of Los Angeles.

Two girls operate this station. It is not on a corner, and competition lies in both directions. Yet they probably do more business than any station in their locality—and do not get it on their looks alone either. Their methods are such, if applied by the average garageman, as would help him to develop sales and steady customers.

It was in August of 1921 that they opened their station. Some months before that they had been working for another concern, and with such success that they decided they would do well for themselves. First, they decided to take a vacation, so they bought a second-hand flivver for \$450 and drove it to the Yosemite Valley and back.

On the way back trouble developed and they stopped on the way, took the motor out and went over the engine in a thorough manner. Jean Glasgow, one of the pair, is not stumped by any machine, and she and her partner, Marion Drake, made that engine work in a way that was music to the ears.

On their return they sold the machine—for as much as they had paid for it, which was justified in view of the work that they had put on it to improve it. With the proceeds and their savings they decided to enter business for themselves. They found an inside pair of lots. The location seemed all right to them, but friends and oil companies told them not to open there. In fact, one oil company had turned down the lots because

they were not on the corner location.

"We know what we can do," said one of the girls.

"We'll tackle it—and we'll make it go—watch us!" said the other. They



"Jean and Marion."

leased two lots so as to get the advantage of an 80-foot front. Then they hit another snag.

Building restrictions prohibited the construction of buildings of less than \$2,500 in cost. For several days their building operations were held up, for people took it for granted that they would build a cheap stand. Then the

community saw that a high-class place was to occupy the grounds. The girls donned their working breeches and carried stone, helped to build and worked right along on the job. A smoothly-graveled space was prepared, a clean station erected and a white fence ran along the sides and the rear.

"Those girls can never make it," some said after the opening. "An oil station is hard work for a man."

They were not discouraged, however, and their methods are a model for any man who finds his oil station business lower than it should be. They strenuously object to any suggestion that business comes to them just because they are girls.

In the first place, they wear khaki clothing that shows plenty of evidence that they are accustomed to doing any of the work about the place. That removes the first objection a man might have to having a girl serve him.

For another thing—and this is important—they do not give a man a chance to relieve them of some of the work. A man driving up to the station might think it up to him to pull down the air hose, lift the hood, investigate the oil, or save the girls trouble in other ways. They do not let him. Immediately they are at his car and quickly learn his wants and start to supply them.

When a man sees that he not only is not expected to do some of the "dirty work" to save the girls trouble, but cannot if he would, he has no more hesitancy about visiting a garage run by girls than one run by men. He appreciates the quick action and service—and comes back.

Thus customers are coming for many miles to get gasoline and oil and other serv-



Customers Get Real Smiling and Prompt Service at "Jean and Marion's" Service Station.

ice—not because girls run the station, but because real smiling and prompt service is given, in contrast to many places where indifferent service is rendered. The man who comes for air or water, and who does not need oil or gasoline, gets just as pleasant attention as if he were spending ten dollars. Nor does it mean less attention.

As a result, the first month saw the girls clear \$600. Sales have increased ever since and the business, within six months, netted them a thousand dollars a month. Then they began to scout about for a second location.

At first they had one pump. Now they have two 550-gallon gasoline tanks, one 1,000 gallon gasoline tank and one tank for oil. They have equipped their place with a stationary grease rack, extra air towers, sheltered booths and seats, and four reflector lights that make the place as light as day.

They began by hard work and have continued. Between them the station is open at six o'clock in the morning and until midnight or one o'clock in the morning. It is one point on the route that motorists can count upon at all times. A thousand gallons of gasoline are sold every day, with Sundays running almost double that, and oil in proportion.

They have made every effort to

learn ways to reach out and get people to come in who might otherwise not learn of their style of service. They gave out clothes brushes bearing their advertisement, used the newspapers, visited a nearby picnic ground with cards and in this way met crowds that run up into the thousands.

If a man comes for a valve inside, it is given to him gratis. With an order of \$8 or \$9 worth of gasoline, a quart of oil will be given in order to bring people back. A special inducement is being made to drivers and owners of trucks—big consumers—and that is helping the volume.

A garage that does not use the suggestion method of making sales is passing many chances to make increased buyers of those who come to the store. Typical of the girls' method is this sort of a case:

A man in a "brand new" four-cylinder car drove up to the station. It required no fortune-teller to tell the girl on duty that his was a new car and that he was elated over it. As is the case with a pair of new shoes, a man does not like to see his new car gather dust.

"What have you to keep the car clean?" the girl asked.

"Well, I've been using a rag," answered the man.

"Here's a little brush that is made for that purpose," and she flicked off some dust with it after she drew it from the carton.

"I'll take that," he said. And an extra sale was made.

"Naturally," said Marion, "we can't have everything in stock, but we tell our people if there is anything they need that we do not have in stock, we'll get it for them quickly. That makes lots of sales for us that might never come otherwise."

Even the sight-seeing busses which roll along the avenue help the station. "Spielers" for them now point out this station that is run "by a pair of girls." At least 25 steady customers have come as a result.

A man getting air or water is asked in a way that, while it causes him to feel that he is free to help himself or have the girls help him to either of their commodities, also causes him to put in gasoline or oil while he is there.

Another feature, the cost of which is an advertising investment, is the public telephone that is at the disposal of patrons and others.

Thus the girls are not succeeding merely because they are girls, but because they are alert and courteous girls who know their business and like it and are willing to work.

A.E.A. Summer Convention Best Yet

Meeting at Colorado Springs, Colo., June 19-23, a Most Enthusiastic One—Splendid Work Accomplished During Past Year an Inspiration to Members—Plan Continuation of Merchandising Campaign For Coming Year

The summer convention of the Automotive Equipment Association, held at Colorado Springs, Colo., the week of June 19-23, inclusive, has been declared to be one of the most delightful and constructive conventions in the history of the A. E. A.

The first general meeting of the convention was held Wednesday morning, June 21.

President Howard M. Dine, addressing the convention, spoke of the splendid co-operation existing among the manufacturers and jobbers of the A. E. A. and invited other reputable jobbers to join the association and thus enjoy the great benefits of membership.

Commissioner Wm. M. Webster then gave the convention an excellent accounting of himself and the splendid craft he has been piloting the past seven years.

On the afternoon of the first general meeting, the jobbers met in separate session. This meeting was presided over by President Dine, and many matters of im-

portance were brought up and discussed.

At a later meeting, the work which has been done by the merchandising department was discussed and great enthusiasm was shown over the splendid work which has been done. So successful has been the plan of telling the campaign story to the trade by means of literature and meetings with speakers and motion pictures, as carried on throughout the past year, that it was unanimously decided to continue and develop the merchandising movement.

Reports made by jobbers clearly showed the practical value of the work, which has profited manufacturers as well as jobbers. It was estimated that sales had been increased upward of \$1,000,000 as a result of the merchandising campaign.

It was shown that equipment men have lined up with the progressive car and truck manufacturers, distributors, dealers and garagemen for the purpose of promoting throughout the industry better shop work,

as well as adding to the stability and profit of the industry in sales and service.

Continuation of the standardization work of the association was also approved, in an endeavor to eliminate waste in the unnecessary multiplication of sizes and styles of merchandise and to bring about uniformity of packing, labeling and shipping.

The new film, "Shop Profits," which is declared to be infinitely better than the first picture put out by the merchandising department, was shown on the screen. Thirty minutes of intensified interest were given it by the members. That it will have the desired effect on the entire industry as soon as it is released by the members and put into use at dealers' meetings cannot be gainsaid.

A very interesting trailer followed the scenario, showing different pictures of conventions of other days, the number that attended then, the marked increase in at-

(Concluded on page 40.)

Tread Patch, Bias Cut and Inside Boots

How Tread Patch is Made and Placed on Tires—Construction of the Inside Boot and Suggestions for Making it From Carcasses of Old Tires—Quick and Efficient Tire Service Given When Stock of Inner Boot Sizes is Kept

Perhaps the simplest of the many types of repair that tires may need is the tread patch. The method followed in placing a tread patch on a fabric tire is almost the same for tires of fabric-cord or cable-cord carcass. Hence, the method described may be followed in placing a tread patch on any tire, no matter what the carcass construction may be.

A tread patch is used on a tire the tread of which has been damaged by a bruise or a cut. The patch fills in the broken place on the tread, seals it up and protects the other parts of the tire from being damaged.

In preparing the tire for this repair, the extent of the damage is first determined and all damaged or separated tread is removed. The tread and breaker is cut away, leaving a circular hole about the damaged spot, Fig. 1. If the carcass is in a good condition, the tread may now be built up without any carcass repair.

The edge of the tread about the cut-down portion is beveled at a 45-degree angle and buffed, Fig. 2, after first removing all dirt and grease. Wash the spot with high-test solvent and apply three coats of vulcanizing cement, allowing each

to dry until tacky before applying the next.

The tread is now built up with new gum. Place a layer of cushion stock over the cut-down section, allowing it to lap $\frac{1}{2}$ -inch all around the hole. Stitch down the new gum and wash or dampen with high-test solvent. After the solvent has evaporated, build up the tread with tread stock, making the center slightly higher than the surrounding portion of the tire. This will cause the gum to flow down evenly about the edges during the curing. All new gum should be stitched and perforated to eliminate air pockets and insure good contact.

The length of cure for a tread patch will vary with the gum used and the thickness of the repair. This will run from 35 minutes with quick-cure gums to 50 minutes or more with slower cure material. An average is about 45 minutes at 50 pounds steam pressure.

If the carcass of the tire is badly damaged on the outside, it is better to repair the tire by laying back a section. However, chaffed or broken fabric on the inside of the tire may be repaired at the same time the tread patch is made on the

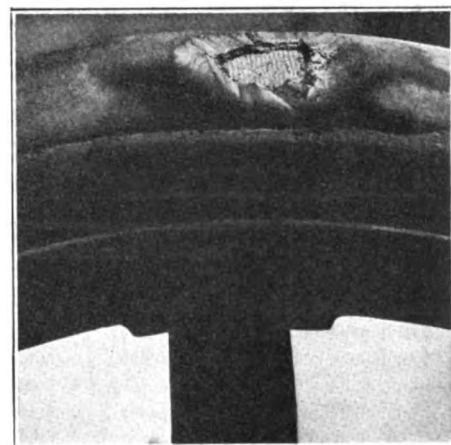


Fig. 1 Cutting Down for Tread Patch.

outside of the tire. Remove one or two plies of fabric from the inside about the chaffed or broken place.

The number of plies removed will depend upon the severity of the injury. If only one ply is damaged, only one need be removed. The removed section will be about two inches on all sides of the damaged spot and will be square or rectangular in shape. If two plies are removed, the second will be stepped $\frac{3}{4}$ -inch; that is, both of its dimensions will be $1\frac{1}{2}$ inches shorter than the corresponding dimensions of the first block-out.

A short boot is now prepared for use on the inside of the tire. This will reach from toe to toe of the bead and will be four inches longer than the largest block-out. Generally this boot is made of two or three layers of fabric—depending, of course, upon the number of plies blocked out of the tires. The plies of the inside boot are stepped down to the dimensions shown in Fig. 3. This particular boot is made of three plies. Stepping down the boot in this way leaves no sharp edges to injure the tube. The portion of the boot that fits against the inside of the tire should be covered with cushion stock.

The inside of the tire is now buffed by turning the tire, Fig. 4, or using a flexible shaft buffer, Fig. 5. In heavy cord tires—where the carcass is especially stiff and rigid—a flexible shaft buffer is almost a necessity. In case the shop equipment does not include such a buffer, it will be necessary to use emery paper and handwork on the inside of heavy tires. After buffing and cleansing the cut-down section, it should be washed with high-test solvent and cemented with three coats of vulcanizing



Fig. 2. Buffing the Tire for a Tread Patch.

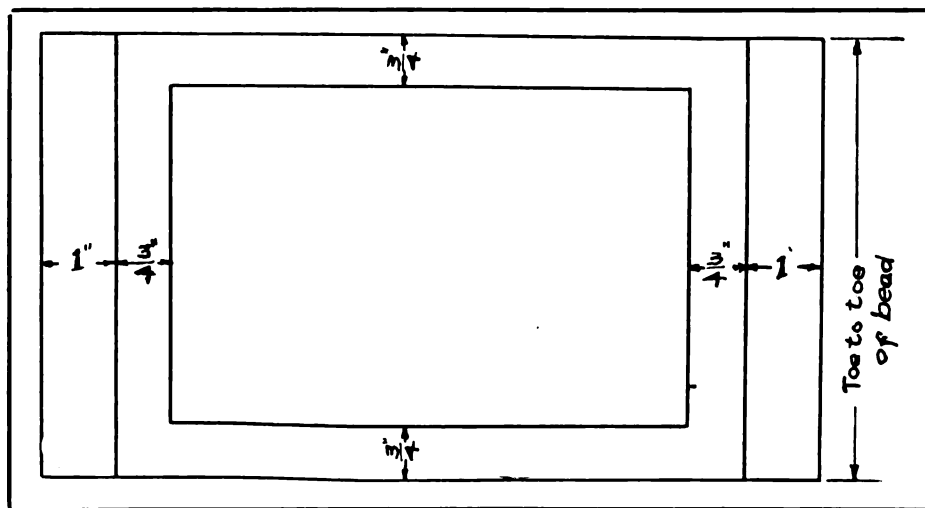


Fig. 3. Dimensions of Three-Ply Inside Boot.

cement. The side of the boot to be applied is treated in a like manner.

Boots are troublesome to handle when cementing and drying. The boot stretcher shown in Fig. 6, will be especially convenient when applying the cement and hanging the boot up to dry. A frame of light wood is made, somewhat longer than the boot, and fish-hooks with barbs removed are attached to each of the corners with strips of inner tubing. Each corner of the boot is fastened to a hook, the rubber attachments stretching the boot while it is cemented and dried. Several of these stretchers, accommodating the average boot sizes, will be found very handy in the average shop.

In applying the boot to the inside of the

tire, start at the toe of the bead with one edge, working from the center towards the ends at all times. Continue across the inside of the tire, making sure that good contact is secured at all points. With a little practice, the repairman can tell by touch if the boot is fitted correctly.

After the boot is fitted, place the tire on a building mandrel and build up the tread as before. If one of the outer layers of fabric is damaged, the rotten or damaged fabric should be cut out and the edges skived to a feather edge before the tread is built up with new gum. If the damage to the outer plies is very serious, the tread-patch method will not do and a more elaborate repair should be used.

Select an air bag of the proper size and

fit it to the inside of the tire. If an impression pad is to be used, fasten it in place, using the usual heat cloth and soapstone preventive. Tires of the clincher type of rim will make it necessary to clamp the bead plates on the tire before placing in the sectional mold. If the tire is a straight side, the plates are applied after the tire is in the mold. Tighten the bead plates down to the air bag, inflating the bag to the pressure recommended by the manufacturer. Tighten up all clamps and cure.

If an inside arm vulcanizer is included in the shop equipment, the repair may be

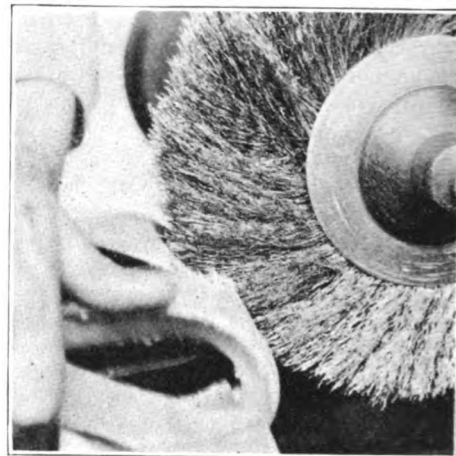


Fig. 4. Buffing Inside of Tire on Buffing Wheel.

partially cured in the sectional mold and then transferred to the inside arm for final cure. This method is, perhaps, better than completing the cure in the sectional mold, as there is no danger of overcuring the tread. If this method is followed, the time of cure in the sectional mold will be the same as when no inside boot is used. If no inside arm is available, the tire is cured 25 minutes additional in the sectional mold.

Another method of handling the cure is by the use of an inside arm and a tread-patch vulcanizer. Using this method, the tire is wrapped to the arm and the tread-patch vulcanizer clamped on the repaired part of the tread. There is not the danger of over cure in this method that will be found in the complete cure in the sectional mold. The time of cure in this case will be about 45 minutes.

In making the inside repair for a tread patch, an inside boot may be applied without blocking out any plies. This should not be done if more than one of the plies is damaged and the ply should be carefully skived around the damaged portion.

A nail hole, penetrating the tire, is repaired with an inner boot, blocking out two plies of fabric from the inside of the tire, and building up a tread patch. In this repair, the dead fabric is skived off on the outside as much as the size of the tread patch allows.

An inexpensive repair for separated or injured fabric, on the inside of the tire,

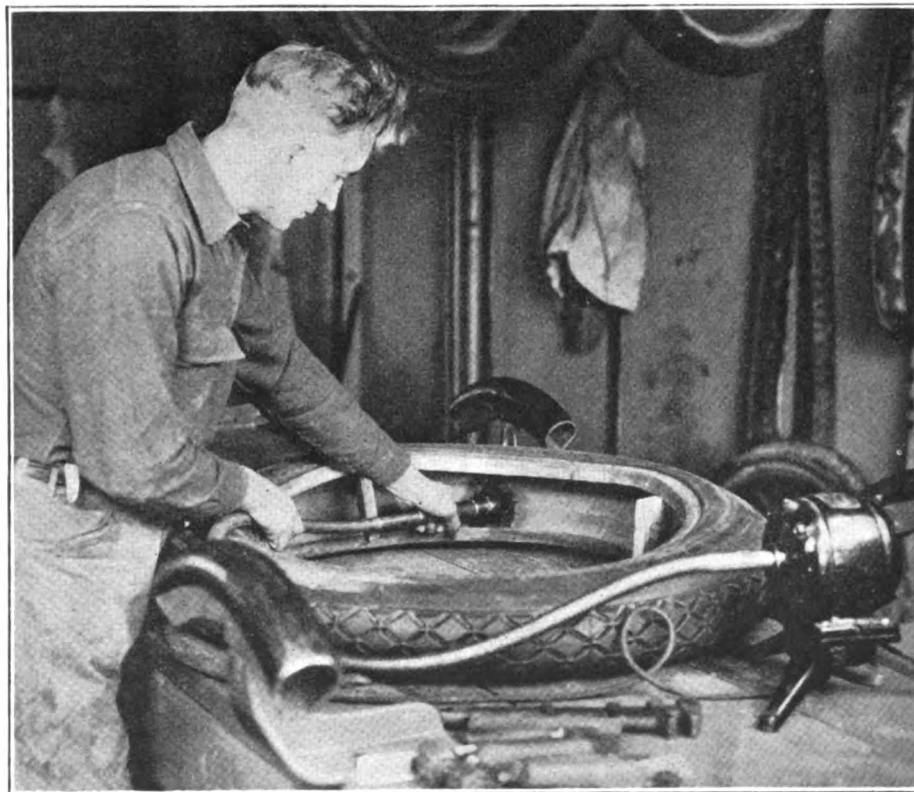


Fig. 5. Using the Flexible Shaft Buffer on a Tire.

may be made with what is known as a bias-cut repair. This repair should be used only when the customer insists upon a low-priced job. If carefully done, it may give quite good service.

To make the bias-cut repair, the inner ply of fabric is cut diagonally four ways from the injury. Each flap should be laid back, Fig. 7, so that it clears the injury four inches each way. A block of new fabric is fitted to the uncovered section. Buff, wash and cement the uncovered section before filling with cushion stock. Fit in the block of new fabric that was cut, and turn back the flaps. Stitch the repair well and lap the edges of the bias-cut with cushion stock.

An inside boot of three plies is used to reinforce the repair. On the side of the boot that goes next to the injury, place strips of cushion stock. These strips should be about $\frac{3}{4}$ -inch wide and the same distance apart, running lengthwise of the boot. This treatment is commonly called "stripping" the boot. Place the boot in the tire and roll down well. If a very smooth inner surface is wanted, the ends of the boot may be lapped with cushion stock.

In case the tread is injured at the same point, a tread patch should be used. If no tread patch is needed, the repair can best be cured in an inside arm vulcanizer. A tread patch in conjunction will require the use of the sectional mold or a combination of the sectional mold and the inside arm.

So many tire repairs include the use of an inside boot that the tire man should be acquainted with the best methods of making them. Boots may be made from carcasses of old tires or entirely from new material. Boots of new fabric are seldom used, their cost being prohibitive. However, they may be used to good advantage if the condition of the tire to be repaired justifies it.

Boots may be made in a variety of

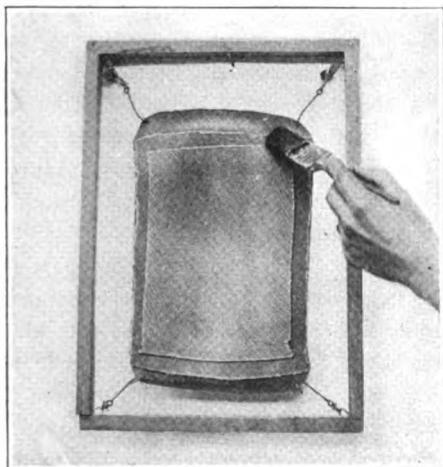


Fig. 6 Using a Boot Stretcher.

sizes, to suit the requirements of different repairs, but in any case they should be no less than four inches longer than the largest blocked-out section. In making boots of old material, select tires for that pur-

pose that have especially good carcasses. A large notched tread knife is used to remove the tread, Fig. 8. The tread and outer ply of the carcass may be removed at the same time or, if the condition of the outer ply makes it usable, the tread, sidewall and bead cover only may be removed.

A tread knife must be kept sharp and will work easier if dipped in water before a cut is taken. Beginning at the channel of the bead, at one side of the tire, cut across to the opposite bead, opening the rubber down to the carcass. A notched tread knife is used to cut along the tread line on either side of the tire, separating the rubber into three strips.

After cutting around the tire, take a small screwdriver and loosen the edges of the tread and sidewalls along the cut. The

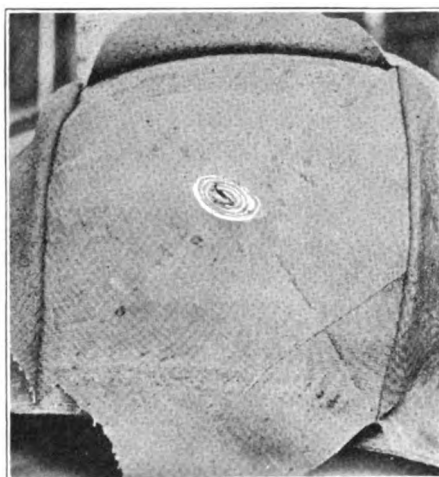


Fig. 7. Inner Ply of Fabric Laid Back for Bias-Cut Repair.

screwdriver is again used to pry up the ends of these strips, loosening them as they are pulled back. In stubborn cases, where the rubber adheres tightly, it may be necessary to remove the rubber in small strips but, ordinarily, the tread and sidewalls may be stripped back as units.

The bead cover is removed next. If the ending of the cover cannot be located, a starting point is made by cutting around the bead with a fabric knife. The cover is now pried loose with a screwdriver and stripped from the bead. Now cut the bead from the carcass, following the bead channel and keeping as close to the bead as possible.

A tire, cut down for inside boots, usually has a damaged spot in the carcass. Remove this, and any other damaged spots that may be found, by cutting out complete sections at the point of injury. Boots should not be made from sections of tires having separated plies. If such a condition is found, the separated ply must be removed, buffed and cemented back in to place.

Cut the carcass into sections that will give the desired length of boots. Generally the boots will be from 12 to 14 inches long.

Boots are usually cut from old tires that are $\frac{1}{2}$ -inch greater in cross-section than the tire they are to be used in. The ply that goes next to the inside of the tire lacks $\frac{3}{4}$ -inch on either side of reaching to the bead. The remaining two plies of a

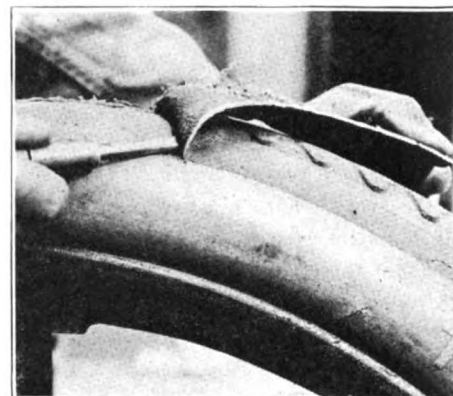


Fig. 8. Cutting Down an Old Tire for Inside Boots.

three-ply boot will be wider and reach to the toe of either bead. The middle ply is stepped $\frac{3}{4}$ -inch from inner ply and one inch from the outside ply of the boot.

If the fabric skiver—a machine used for beveling the edges of fabric—is used, the boot will automatically be cut down to size. Care must be taken when cutting boots with a fabric knife, or more than one layer will be cut. The knife should be held parallel to the fabric and kept well sharpened. Do not twist the knife as the delicate point is easily broken.

Boots may be made by following the same methods, whether of fabric or fabric-cord carcasses. More plies are needed in fabric-cord boots, as it takes approximately two plies of a multiple cord tire to equal one ply of the ordinary fabric carcass. In cutting five-ply cord boots, three plies are stepped as in the method outlined and the remaining two plies stepped $\frac{3}{4}$ -inch each on ends and sides, the smallest block of the boot fitting next to the inside of the tire to be repaired. Boots are seldom made from the carcasses of tires of the larger cord.

All boots are thoroughly buffed and cleaned after cutting down. To prevent the corners of the boot from working loose, it is best to round them slightly.

A smaller boot, used in reinforcing without blocking-out the carcass, is made by making the ply fitting next to the tire two inches wider than the injury; the second, two inches wider than the first; the next, three inches wider than the second; and the fourth, wide enough to reach from toe to toe of the bead.

Boots may be made of new material but their expense restricts their use to a few cases only. New fabric—friction-coated on both sides—is used for all plies except the last. The last is made of "bareback," a material that is similar to the fabric but friction-coated on one side only. The plies

(Concluded on page 50.)

Current Comments and Observations

By The Editor

Going Stronger Than Ever.

Production figures for June give the number of motor cars and trucks turned out by the manufacturers as 271,000. This is the greatest number ever produced in a single month. It exceeds the previous high total of March, 1920, by 51,000 and is 15,000 greater than May's record.

There is apparently an increasing demand for motors in practically every part of the country except Maine and Georgia. Many of the agricultural states are showing substantial increases over last year.

Crops are promising and the recent rains in the corn states have saved the corn crop. Indications are that when the crops are harvested—and they promise, in general, better than their average for the past five years—the farmers will again be buyers.

But regardless of what business may be the remainder of the year, the automobile industry will have had a good year. General business promises to increase during the fall so there should be no great falling off in the automotive field.

* * * *

A Strange Sight.

"Wallace Rides to White House Behind a Horse" was the heading over a news item that recently appeared on the front page of a Chicago newspaper. Says the item:

"Times do change," Secretary of Agriculture Wallace remarked as he climbed out of the horse-drawn carriage which, by custom, conveys the agriculture chief on official missions, and entered the White House executive office for the regular cabinet meeting. His small grandson, aged seven, rode with him in the ancient equipage. "That is the first time this boy ever rode behind a horse," he said.

Apropos of Washington's official customs, it might be mentioned that when President Taft rode with Mr. Wilson down Pennsylvania Ave. to the inaugural ceremony of the latter, the old horse-drawn barouche transported them. Eight years later, however, when President Wilson turned over the reins of government to Mr. Harding, the famous "Ride of Presidents" was taken in a modern motor vehicle.

So we may look forward to Secretary Wallace's horse-drawn conveyance being replaced some day by a modern motor conveyance.

In these days of rapid progress, and wonderful developments, it is not surprising that young children have not enjoyed what to their parents were most customary sights and pleasures. The horse-drawn street car is probably a sight that many parents of present-day children have never seen—but it was only a few years ago when it was a customary mode of transportation.

As Secretary Wallace says: "Times do change."

* * * *

Human Interest, Courtesy, and Tact.

"Advertising built my business for me, and my aim today is to outdo in newspaper advertising the mail order houses, which flood my district with circulars."

This is one of many highly successful recipes for business boosting given by Fred P. Mann of Devil's Lake, N. D., in telling a group of salesmen how he sold \$500,000 worth of merchandise in a town of 5,000 during the slump year of 1921.

A great many of the smaller garages apparently are not alive to the possibilities of advertising and merchandising. Many regard them as "big town stuff"—but Mr. Mann's experience is that advertising develops business in the small town just as well, if not more, than in the larger cities.

It's the injection of human interest into business and advertising that brings greater returns and in many cases is the deciding factor in the success of an enterprise. Just what "human interest" covers is rather difficult to definitely specify—but it is quickly recognized as the thing that pleases and attracts attention of many people.

Courtesy and tact are elements that are strong in those most successful in injecting human interest into business. It is through their ability to understand human nature that they are able to discover the human interest side in people and take advantage of it in business and in advertising.

"Excuse me, suh!" exclaimed a negro houseman upon discovering the lady of

the house in the tub when he appeared to clean up the bathroom.

In telling about it later, he explained, "That 'excuse me' was courtesy, but that 'suh' was tact," all of which indicates an understanding of human nature and utilizing it in getting out of a difficult situation.

But how often does the garageman apply his knowledge of human nature, courtesy, and tact to the constructive building up of his business? Think it over!

* * * *

Cannot Stem Rising Economic Tide.

There are many business "straws" that taken individually mean little but cumulatively they offset the strikes and mark the end of unemployment for those not voluntarily or seasonably idle.

No national economic straw is more significant than postal and banking statistics. June postal receipts were the greatest recorded. Bank clearings for the first week of July were 11 per cent over last year for New York City, and 12 per cent outside. The average daily clearings for June were the largest since December, 1920. This is remarkable, for it reflects business rather than security speculation.

The Federal Reserve debits to individual accounts are thought by many a more trustworthy sign than even bank clearings. The total for the Fourth of July week was \$8,648,618,000, against \$7,805,316,000 last year.

That the freight movement is growing, despite the coal strike, is a sign that it will grow faster when the winter supplies of coal begin to move and industrial processes are stimulated by fuel supplies.

While no one denies the seriousness of the strike situation, it is apparent that generally the country is persuaded that when conditions become too bad to be endured, they will be corrected. This opinion is based upon the acts of those who have the largest stakes in preparing for the future.

There is so little doubt about the economic trend that the Harvard Economic Service says in its survey and forecast for July that recovery is now "well advanced" and that "general business prosperity" may be looked for.

Use and Operation of the Magneto

Magneto Still in General Use in Truck and Tractor Field Though Battery System of Ignition Is Used Almost Exclusively on Passenger Cars—Types of Magnetos Described and Illustrated With Principles of Their Operation

By J. R. Bayston, M. S. A. E.,

Automotive Director, Coyne Trade & Engineering Schools

Despite the fact that the battery system of ignition is used almost exclusively on passenger cars, the magneto still holds its own in the truck and tractor field.

The early type of magneto was used in connection with a high-tension coil. The magneto proper was low tension. The field of the magneto was a permanent horse-shoe magnet. A shuttle, wound with a primary winding, revolved between the poles of the permanent magnet as shown in Fig. 1. In Fig. 1-A, which shows the shuttle-type armature in a horizontal position, the magnetic lines of force are passing through the core from the north to the south pole.

When the armature is turned to the position shown in Fig. 1-B, there are two paths for the lines of force in travel—one is directly across the end of the shuttle, and the other is through the armature. The exact path that the lines of force will take will be determined by the resistance that each path offers to its flow.

If the armature is turned still farther as shown in Fig. 1-C, the lines of force, instead of going through the armature at the end *a*, will enter at *b*. In other words, the direction of flow of the lines of force through the armature has been reversed. When this happens, a current is induced in the primary winding. At this same time, the breaker points open as shown in Fig. 2. The current induced in this winding flows through the primary winding of the induction coil.

When the points open, the magnetic field set up by this current flow instantly drops to zero inducing a high tension current in the high-tension winding. This current goes to the center of the distributor and then to the spark-plugs as shown in Fig. 3. One end of the primary winding of the armature is grounded to the shuttle so that the electrical circuit will be completed.

From our work on battery ignition we know that the opening of the interrupter points gives the sudden demagnetization of the induction coil core that produces the high-tension spark. The magneto interrupter acts in exactly the same way. The cam on the magneto generally has two high spots only, while the cam on the battery system generally has as many high spots as there are cylinders. This is about the only difference between these interrupters.

As the cam is turning as shown by the arrow, Fig. 4, it can be seen that it is just ready to strike the fiber bumper and cause the points to open. At this same instant, the armature should be in the position where the reversal of the magnetic lines of force occurs.

Remember that it is the *change* of magnetism and not magnetic flow that induces the current in the primary winding. While this gives the best results, it does not necessarily mean that, if the points open a little before or after this position, there will be

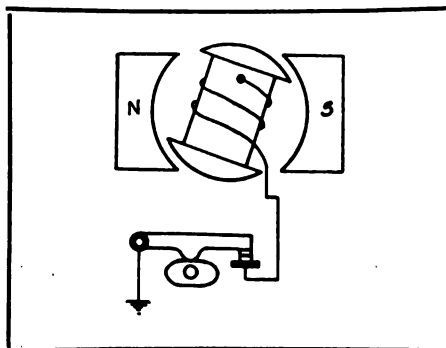


Fig. 2. Breaker Points Open.

no spark. The spark will be weaker when we start to leave this ideal position.

Due to the fact that the engine needs different timing for the spark at different speeds, provision must be made for re-

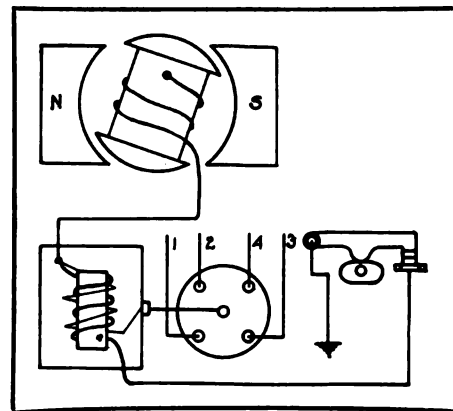


Fig. 3. Current Goes to Center of Distributor, Then to Spark-Plugs.

tarding and advancing the spark. This is done on the magneto by rocking the interrupter housing shown in Fig. 4 around the cam so that the cam will meet the breaker arm sooner or later. When this is done, it is impossible with ordinary construction to have both the retard and the advance spark full strength, for one will occur a little off of the high peak.

It will be found that on most magnetos the advance spark, where most of the running occurs, is the strongest spark. The retard spark is somewhat weaker and on low-tension magnetos where batteries are generally used for starting, this was quite satisfactory, as the spark was immediately advanced after the engine was started and the switch turned to magneto.

The first use of the magneto that we will discuss will be as a substitute for a battery. The method of connecting is shown in Fig. 5. The current from the insulated side of the armature coil connects to the ignition coil at *b*. The circuit is then through the primary coil and from the terminal *c* back to the interrupter point *d*. When these points close, the circuit is completed back to the ground, which is the other end of the primary winding of the magneto. An alternating current will then flow through the primary winding as the magneto armature rotates.

Just as the peak values are reached, the interrupter points will open stopping the flow of current, and the sudden demagnetization of the coil will induce a high-tension current in the secondary winding of the ignition coil. As the secondary is connected to the center of the distributor, this current will go to the spark-plug, returning to the other end of the secondary winding of the spark coil through the ground.

Another method of connecting the mag-

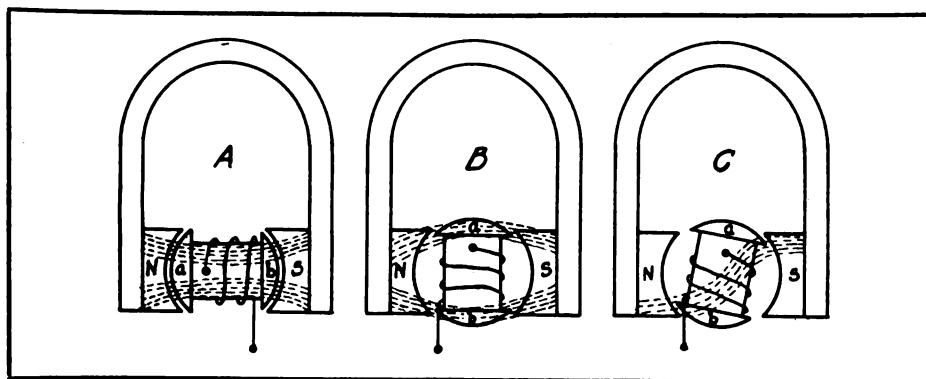


Fig. 1. Shuttle Wound With Primary Winding Revolved Between Permanent Magnet Poles.

neto is shown in Fig. 6. This system, however, is not suitable for battery ignition as an emergency supply. In this system, the magneto winding, interrupter, and the ignition coil are connected in parallel instead of in series and the electrical action

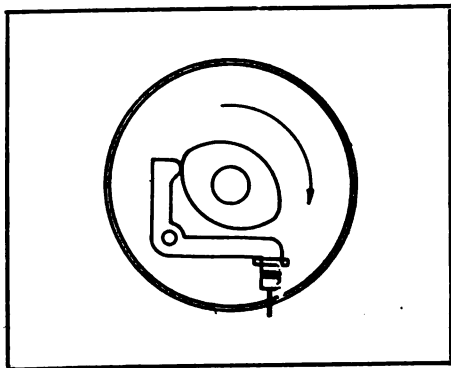


Fig. 4. Arrow Indicates Turning of Cam.

is somewhat different. With the interrupter points closed, the magneto winding is short-circuited and all of the current flows in the magneto winding and none of it flows in the coil. This permits a heavy current to flow in the armature coil itself, setting up a strong magnetic field.

When the interrupter points open, the current in the magneto, due to the magnetic field or self inductance, can take but one other path, which is through the primary winding of the ignition coil. This sudden flow of current in the ignition coil suddenly magnetizes the core instead of demagnetizing it. The spark is just as strong if the demagnetization is very sudden. In either case, however, it should be noted that the spark occurs when the points are opened and *not* when they are closed.

It is generally found that the magneto is connected in parallel with the coil, while the battery must necessarily be connected in series with the coil and the breaker points. Such a connection is shown in Fig. 7 where a magneto is shown connected to a regulation transformer or spark coil having a primary and a secondary winding, a condenser and a switch so that either current from the magneto or the battery may be used at the will of the driver.

A noticeable peculiarity of this circuit

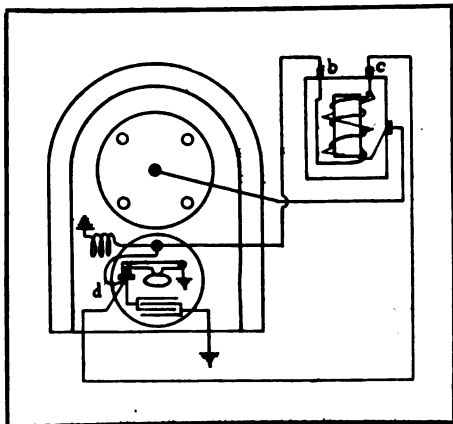


Fig. 5. Connecting Magneto Used for Battery.

is that while there is a ground in the system, it is not at either end of the battery. Therefore, it is generally impossible to use a grounded battery on a low-tension ignition system.

When the switch is in the battery position, the current leaves the battery at the positive, or carbon post, and goes to the *INT* terminal of the coilbox. The current does not go into the coil here but goes to the interrupter and across the contacts to the ground, which completes the circuit to the *G* terminal of the coilbox. The current then flows through the primary winding of the coil, through the switch arm, returning to the *B* terminal on the coilbox to which the other side of the battery is fastened.

In this circuit the series connection has been used. The parallel method would short-circuit the battery when the points closed and there would not be an induction present to send a heavy flow of current through the primary.

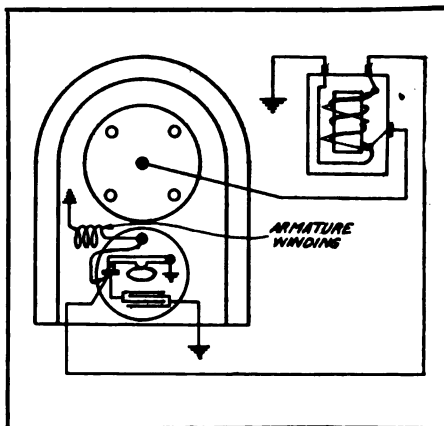


Fig. 6. Another Way to Connect Magneto.

When the switch is on *MAG*, we find that the parallel connection is used. A connection is then made from the upper end of the primary to the *MAG* terminal, *ARM* terminal and the *INT* terminal. The magneto circuit is then through the interrupter to the ground when the points are closed; when they are open, the only path is through the primary winding of the coil to the ground, and the sudden rush of current induces the high-tension current in the secondary winding.

The magnetos that we have discussed are of the shuttle type. The Remy organization put out a type known as the inductor type. The principle of this magneto is shown in Fig. 8. Fig. 8-B shows the end view, while Fig. 8-A is a top

view with the magnets and the pole pieces cut away so that the coil can easily be seen.

The coil is the shape of an ordinary Ford magneto coil. The shaft of the magneto runs through the center as indicated in the illustration. An assembly of iron

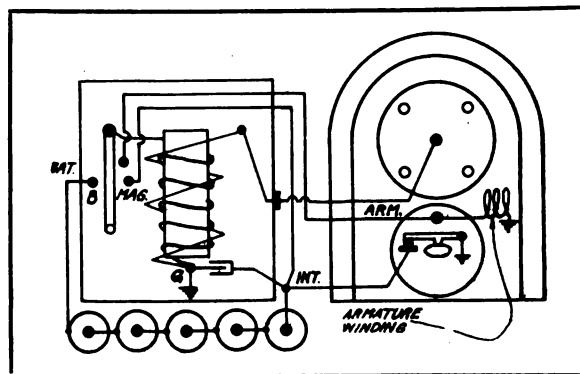


Fig. 7. Magneto Connected So That Current From Either Magneto or Battery Can Be Used.

stampings is mounted on the shaft on each side of the coil. These are called the inductors. One of these inductors extends from the shaft in one direction, while the other extends in just the opposite direction. The two inductors and the shaft form a magnetic path for the lines of force to travel from the north to the south pole. It can also be noted that this magnetic circuit is through the coil.

If the shaft is rotated so that the shaft is turned through a distance of 180 degrees, the lines of force will still be able to travel from the north to the south pole, but to do so they must travel through the coil in the *opposite* direction. The rotation of the shaft continually reverses the direction of the lines of force through the coil. This reversal induces a voltage in the coil causing a current to flow from the high-tension coil. From here the action is identical with that of the shuttle type magneto.

America Leads in Danish Imports of Automobiles.

The United States furnished 5,600 of the 7,283 passenger cars and trucks imported into Denmark during 1921, according to information received from Consul General Marion Letcher, stationed at Copenhagen.

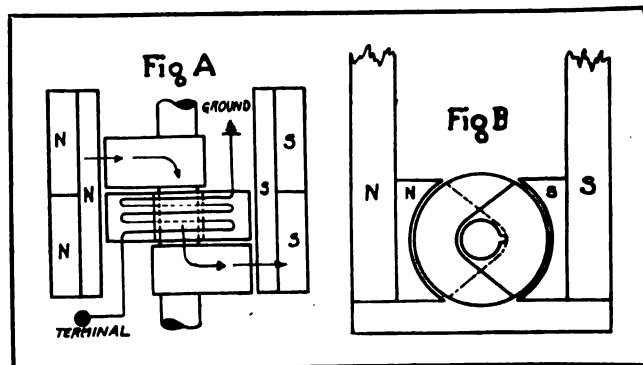


Fig. 8. Showing Principle of Inductor Type Magneto.

Legal Rulings of Interest to Garagemen

Loss of Money on Contract Held to Be No Defense in Action for Recovery—
Court Sustains Right of Automobile Salesman to Apply Travel Expenses on
Car Rental—Arizona Law Covering Garage Keeper's Lien on Car for Storage

By R. R. Rossing

Recovery of Motor Bus Bodies from Seller of Trucks.

In an action for possession or the value of motor bus bodies, brought by the seller, who had reserved title and was entitled to possession because of the buyer's default, against defendants, who had sold the buyer the trucks and had retaken possession of the trucks with the bodies attached because of buyer's default, it was held to be no defense that the defendants had lost money on their contract with the buyer, despite the appropriation of the plaintiff's property.—*A. Meister & Sons Co. v. Harrison*. District Court of Appeal, Cal. 206 Pacific 107.

Is the Garage Owner the Manufacturer's Agent?

Where a person conducts a garage and is engaged in selling automobiles manufactured by a certain manufacturing company, the question whether the relation of principal and agent exists between the manufacturer and the person operating the garage will be determined by the terms of the written contracts entered into by them.

This holds in the absence of any act or admission by the manufacturer that the person operating the garage was authorized to bind the manufacturer by contract in the sale of automobiles manufactured by the company.—*Paige-Detroit Motor Car Co. v. Pintado*. Supreme Court of Florida. 89 Southern 549.

Automobile Salesman Can Apply Expenses on Car Rental.

Where automobile was leased by one employed as salesman by lessor, the salesman had the right to credit on rent installments any items or credits to which he was entitled arising in the course of his employment with the lessor; the law supplying the contract that they should so apply in view of the California code of civil procedure, paragraphs 437, 438, 440.

In replevin by lessor of automobile, based on an alleged default, wherein defendant claimed certain credits by reason of expenses incurred in his employment with plaintiffs when traveling, the court held that the defendant was entitled to prove, as an independent statement or admission and wholly without reference to impeachment, a statement of one of the plaintiffs in a deposition that plaintiffs had agreed that defendants was to have "any expenses of going out of town, hotel bills or anything

incidental to the business."—*Automobile Truck, Tractor & Implement Co. v. Salladay*. Court of Appeal, Cal. 203 Pacific 163.

Injury Held to Be One Arising Out of Employment in Garage.

A garage employe was repairing tires when struck by a bullet from an employer's gun, which was intended for a stranger with whom the employer had a controversy over the purchase of gasoline, which resulted in the shooting by the employer to defend his business.

The court held the employe to have sustained an injury "arising out of and in the course of the employment," within the Workmen's compensation, insurance and safety act of 1917, article 6 (a), in view of section 69 (a), though the accident was unusual, and was not anticipated nor peculiar to the employment.—*General Accident, F. & L. Ins. Cor. v. Industrial Accident Commission*. Supreme Court of California. 200 Pacific 419.

Liability for Car Delivery to Holder of Bill of Sale.

Where plaintiff and M. traded automobiles, plaintiff giving M. a bill of sale, but refusing to deliver his automobile to M., and instead storing it in the defendant's garage, from which it was procured surreptitiously by M. upon exhibiting the bill of sale, the court held that delivery to M. was delivery to the owner precluding liability for such delivery on the part of defendant.

In an action against a garage keeper for failure to deliver a car placed in his keeping, the court held that evidence on cross-examination that a bond for the defendant's protection had been given by a third party claiming the car, was error.—*Beazley v. McEver*. Court of Civil Appeals of Texas. 238 Southwestern 949.

City-Owned Automobiles Driven Without License Plate.

Oregon laws of 1919, page 704, providing a penalty for driving a motor vehicle upon the public streets of a city without license plates displayed thereon, applies to a chauffeur for a city driving a city-owned automobile upon city streets without such number plates so displayed.

The laws of 1919, page 724, paragraph 43, regulating operation of motor vehicles on public roads, having expressly exempted

from registration and licensing federal-owned motor vehicles and traction engines, fire engines, etc., those not within the exception were without it, and city-owned vehicles other than those expressly mentioned were subject to the statute.—*State v. Preston*. Supreme Court of Oregon. 206 Pacific 304.

Garage Keeper's Lien on Automobile for Storage Charges.

Arizona civil code of 1913, paragraphs 3673, 3674, giving a person who has repaired any vehicle a lien thereon for such repairs, did not give a garage keeper a lien on an automobile for storage charges.

The civil code of 1913, paragraph 3672, giving "proprietors of livery or public stables" a lien on "animals placed with them for feed, care and attention and also upon such carriages, buggies, vehicles or other equipment as may have been placed in their care for the amount of charges against the same," was held by the court not to give a garage keeper a lien on an automobile for storage charges, though an automobile is included within the term "vehicle," a garage keeper not being a proprietor of livery or public stables within the statute.

Under the civil code of 1913, paragraph 3687, a keeper of a garage in which an automobile was kept did not have a common-law lien on such automobile for storage charges, unless it was left with the garage keeper strictly for the purpose of storage without any agreement, either express or implied, that the owner should have the right of its continuous use, since such lien is merely the right to detain the automobile until charges are paid, and is, therefore, dependent upon possession, and since the automobile is not in the possession of the garage keeper if subject to the owner's control.—*Fishback v. Foster*. Supreme Court of Arizona. 202 Pacific 806.

Massachusetts Court Rules Broker's Agency Not Exclusive Unless Stated.

The ruling of the Massachusetts Supreme Court in the recently contested case of *Stuart vs. Newman*, concerning the contract for the sale of a garage on commission, is one of considerable interest to garage owners. The plaintiff was generally employed to find a customer who was able and willing to buy the defendant's lease of a garage.

If he succeeded in making a sale which
(Concluded on page 40.)

Welding, Cutting and Brazing Practice

Beginner Should Obtain a Clear Idea of the Theory of Fusion Welding Before Taking Up the Actual Welding of Metals With the Oxy-Acetylene Torch—Types of Fusion Welds Discussed and Methods For Making Them

By David Baxter

Before taking up the actual welding of metals with the oxy-acetylene torch, the beginner should endeavor to obtain a clear idea of the theory of fusion welding. He should have considerable knowledge of the components of a fusion weld before he tries to apply the welding flame to any broken parts. Try to fix in his mind what he is supposed to do and how the different elements will act and react under the treatment. In short, he should know what a fusion weld is, theoretically, before he tries to make one.

Most students, on the contrary, are taught to regulate and manipulate the welding flame before they are taught anything else. They know their torch and flame fairly well before they are taught that the welding is a recasting process instead of merely sticking two pieces of metal together by the aid of the flame.

The fusion weld, then, is a thorough mixing of the fused metals—the filler metal and the job metal. This mixing should be like pouring water into water without stirring. Scientifically, the metals are mixed together until they become one body of metal. The water theory, however, in actual practice, is more often impractical if not impossible. The metals must be stirred and churned often to bring up oxide or other impurities to the surface where they may be removed from the molten weld.

A weld that does not flow together as one mass, but which is merely overlapping sections of metal, is only an adhesion—the parts are merely “stuck” to each other.

Where new metal and the metal of both

With this thought in mind, the student should endeavor to melt the casting metal as nearly as possible without changing its nature. Where it is necessary to add new metal, or filler metal as it is called, this metal should also be melted without



Pinholes and Slag Spots in Cast-Iron Weld Magnified Many Times.

changing the nature of it; especially where the same kind of metal is used for filler that is in the broken job.

By this it is meant that the action of the welding flame causes the structural and other properties of the metals to be changed, if the melting is not properly accomplished. The flame may be handled incorrectly, to the detriment of the weld, or it may change the nature of the metal by not being regulated as it should. For instance, the properties of a given metal may be altered by too close an application of a large flame, the good qualities of the metal being burned out. Or the properties are destroyed in the same way by applying a flame that is too highly charged with oxygen.

The physical nature of cast iron, for instance, is changed by a flame carrying an excess of acetylene. In this case the weld and filler metals are impregnated with carbon, which is termed carbonized iron. The weld parts may melt and apparently flow together into one mass as they should but, at the same time, the full value of the bond is absent because the nature of the metal has changed through the carbonizing process.

So we see that a true fusion weld is something more than merely flowing the metals into one body, or recasting the part, as it were. It is more — it is recasting without lowering the quality of the weld or changing its components.

Care is taken not only to see that the metal of the weld is actually melted and homogeneously mixed but to be sure that

it is not injured by the chemical action of the flame.

Of course, many articles are welded where a metal is used for a filler that is entirely different from the parts joined. This is done for various reasons but, as a general rule, like metals should be used unless the selection is arbitrary—such as in brazing jobs. In welding cast iron the filler metal should always be cast iron. When the casting is of aluminum, aluminum filler is employed for welding.

On the other hand, we have welding of steels with wrought-iron filler and the brazing of malleable cast with bronze or brass filler metal. Nearly all common grades of steel are readily welded with Norway iron filler.

It will now be seen that the weld is made, theoretically, by flowing the parts together in such a way that there will be no joint—visible or otherwise—whether the filler metal is employed or not. Further, this body of metal must be homogeneous and free from impurities or other defects, and the right metal must be used for the kind of weld to be made. All of this seems simple enough but is not so easy of accomplishment, in actual practice.

Welds that are not made a part of the things welded are not true fusion welds. They are partial or total adhesions, if the job metal and the filler metal are not flowed into one body without unconnected sections and porous spots.

In partial adhesions, parts of the weld are melted together properly, while the rest merely adheres for the time being. It may be impurities that cause the ad-



Greatly Enlarged View of Brazed Joint—To Naked Eye This Appears Clean and Smooth.



Cast-Iron Weld on Half-Inch Metal Showing Unwelded Part of Groove.

parts of the broken job are flowed into one body, the casting is, in effect, recast. It is, in reality, the same, insofar as strength is concerned, as when it was cast at the foundry.

hesion in parts of the weld or it may be that the metals were not properly melted. An instance of this is where the filler and weld are not melted fluid enough to flow into one body.

In the case where the weld is merely an adhesion throughout, the defect is usually caused by the deposit of partly congealed metal on a correct weld or by depositing properly melted filler upon a poorly-melted weld. In both events, the metal of the



Plastic Weld on Sheet Iron Enlarged Several Times.

weld should be hot enough that it will permit the filler metal to settle or flow into it and thus become one pool of molten metal. But the filler metal must be melted fluidly enough to settle into the bath.

So far, we have been referring principally to cast iron and heavier welds of steel, but the same rule holds for all metals: A true fusion weld is made by melting the metals into one pool. However, with aluminum casting metal, the procedure is somewhat at variance, due to the extremely high rate of oxidization of this peculiar metal.

When making fusion welds in aluminum, the filler and casting metal should be flowed into one body, just as much so as in welding iron. This is more difficult to do on account of the extreme lightness of aluminum and because it oxidizes so easily. The oxide coats the molten metal almost immediately and prevents it from joining or settling into the molten weld. In fact, in some cases it will not join the metal underneath unless some mechanical means are employed to break up the oxide, even though a good welding flux has been employed and liberally applied. This is sometimes due to the quality of the aluminum, too.

To assist in making an aluminum fusion weld, a device known as a puddler is utilized. It is quite often absolutely necessary to cause the metals to become one in the bath. The puddler is manipulated to the end that the filler metal joins the weld without intervening flakes or coatings of oxide. The oxide is broken up and floated off before the weld becomes homogeneous.

Where the oxide is merely scattered through the body of the weld, we have another case of partial adhesion. The flakes of oxide prevent parts of the weld from joining or flowing together and, like cast iron or steel, the weld is merely an adhesion if the filler is only melted on top

of the weld without settling into the bath.

An adhesion in any weld is always a weakened condition because the joint does not become a part of the job. It is not a recasting, as mentioned in the beginning.

It is difficult to put in printed form any fixed rule or instruction whereby the beginner may know accurately when he is melting the weld and filler metals properly—that is, so he may know at a glance and without considerable practice just when the metal is sufficiently fluid and yet not burned or oxidized.

This is a subject, perhaps, that cannot be put into words. It is a matter of experience and watchful practice. The beginner must accustom himself to the action of the molten metal under the welding flame. A good way to do this is to practice on small pieces of the various kinds of metal and note the effects of various applications of the oxy-acetylene flame.

The bit of filler is melted upon some refractory substance, such as a fire brick. The flame is held at different angles and different heights, while a watchful eye is kept upon the metal as it heats and becomes fluid. Then the bit is permitted to cool, after which it is tapped with a light hammer to see whether or not it is badly oxidized. In some cases it will be found that the drop of metal has been turned entirely to oxide, although it is apparently all metal. In fact, it resembles metal so closely that the novice is easily misled. When tapped with the hammer, it flies in to atoms.

When applying this test, the operator should recall, as nearly as possible, the condition of the flame and how it was held in relation to the bit of filler during the melting process. He should also remember the changes in physical appearance during the heating and melting.

If he is at all observant, he will soon learn to know when he is undermelting or overmelting. He will soon learn to know by sight the changes from the metal to the oxide state. What formerly looked like molten metal to him will no longer deceive him. To top it off, the average welder soon learns to carry out the melting operations almost by instinct.

The manner of applying the flame has a great deal to do with the success of the welding process, and it is usually a matter of "making haste slowly." The inexperienced operator is likely to spoil a weld by being too anxious to bring the metal to a molten condition—a particularly dangerous proceeding if the flame is a large, high-powered one. He approaches the weld too rapidly with the tip of the flame and then holds it too close as the redness appears and the metal becomes fluid. Before he realizes it, almost, he has burned the surface of the metal and yet the penetration of the heat is not sufficient to make a good weld.

Therefore, it should be suggested here

that a slow, soaking application of the oxy-acetylene flame is the best in the long run. In this the operator is not so hasty but holds the flame back and permits the heat to soak in, so to speak. At least, he draws the flame back a little as the metal starts to turn red-hot. Then he maintains this position until the metal melts to fluidity, thus allowing the heat to penetrate or soak in deeply enough to make the weld fluid the desired depth.

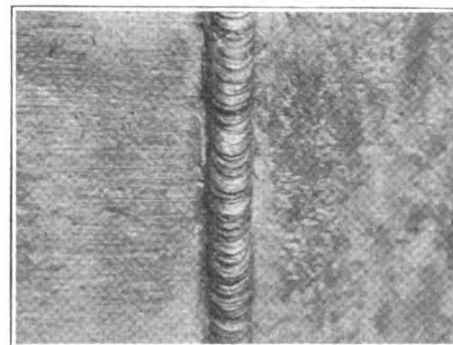
This might be made clearer by comparing the process to pouring water upon the ground. If the water is poured slowly, in one spot, it will sink into the ground to moisten it to a considerable depth, but, if the water is poured rapidly or is dashed upon the ground, it will run off without moistening more than a skin of the surface, unless the pouring is long continued.

Even then, it will not wet as deeply as it would if it were poured slowly the same length of time and the rapid dashing will wash the surface out and away. This might also be likened to the action of the welding flame—if it is applied with great intensity, it tends to burn the surface of the metal and wash or blow it away.

The welds we have been referring to so far are principally what are termed plastic fusion welds, a variation of which is called the "ripple weld," such as is frequently employed on thin sheet-metal welding.

Strictly speaking, a ripple weld might be classed as a sort of adhesion, although if properly executed it actually joins the parts welded. That is, the filler metal penetrates the parts welded, which is not the case in a mere adhesion. So, for want of a better term, it might well be said that a ripple weld on sheet metal is a penetrating adhesion.

However, in the case of a ripple weld, the operator must endeavor to apply the filler without changing the nature or structure of it or of the parts joined. The flame



A Good Example of Ripple Welding Enlarged Several Times.

and filler rod must be applied in such a way as to prevent burning or otherwise weakening either of the metals.

The plastic weld—as the common form of weld is termed—differs from the ripple weld in that it works the two edges to-

(Concluded on page 50.)

How First Lathe Job Is Handled

Proper Lathe Centers Are the Secret of Good Workmanship—Correct and Incorrect Methods of Centering and Suitable Tools to Be Used For This Purpose—Types of Lathe Dogs—Testing the Job For Trueness of Center Holes

By Gustav H. Radebaugh

Work is held in a lathe by a chuck on large face plates and between the centers. Most of the lathe work is done with the work held between two 60-degree lathe centers. It is on these points that the stock revolves when being machined. Holes of the proper shape and design to fit on the lathe center are placed in each end of the stock.

The relation between the lathe center and the center hole are most important. Considerable development has been made in the standardization of these practices but,

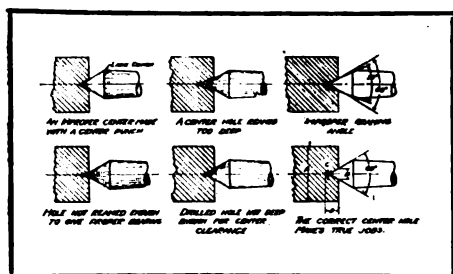


Fig. 1. Illustrating Proper and Improper Centering Methods.

as yet, no definite standard has been established. Tradesmen's methods vary, but generally the ways of doing the job are based on fundamental principles of correct practice.

Many repair jobs come into the dealer's shop for repair that demand knowledge about centers and their uses. Straightening all kinds of shafts, making new tractor-drive and transmission shafts, the shaft for the power circular wood saw, dressing armatures, and the like, are only a few such jobs. Proper lathe centers are the secret of good workmanship, and no mechanic can expect to turn out good, true lathe work without thoroughly understanding the tradesman's practice in centering work.

Centers used on the lathe are known as the "live" and "dead" centers. The live center is in the head stock, being fitted into a sleeve which is held in the spindle. This center is also known as the spindle center. The dead center is found in the tail stock. These centers are both hardened. It is, however, a very common practice—especially if the shop is not provided with means for grinding the centers—to leave the live center soft so it can be redressed, when needed, with a turning tool.

Both of these centers are shaped to a 60-degree point. If work is revolved on these points, a hole must be placed in the work that will permit the entrance of the centers deep enough to act as a support. The holes should also be made so that as little heat will be generated as possible.

In Fig. 1 is shown several proper and improper methods for centering stock for lathe turning. One of the improper practices that is most common is the making of a center hole with a center punch, as shown in the illustration. Notice that there is no point clearance for the center. This kind of a center hole is the cause of the lathe center being worn off at the extreme point, and also causes work to be turned that is elliptical in cross-section.

Center punches, such as shown in Fig. 2, are not made or intended for this type of job. They are used for establishing drilling centers on drilling jobs. To properly locate and drill center holes in stock, tradesmen have developed the use of the several tools shown in Fig. 2. These tools are used for finding the center of the stock in several different ways.

If one plan is followed, it is not necessary, of course, to use the other tools. Some shops are provided with centering machines, which eliminate the use of these tools with the exception of the combination drill and countersink. In the station repairshop, the installation of a centering machine would not be justified, as these machines are only installed in plants where the centering of stock is, to a degree, a continuous requirement.

To make it convenient to lay out the center on the end of the stock, the piece to be centered is coated with chalk so that

| DIAMETER OF STOCK - A | LARGEST DIAM OF CENTER - B | SIZE OF DRILL - C | DEPTH OF HOLE - D | SIZE CENTERED DRILL & CHUCK |
|-----------------------|----------------------------|-------------------|-------------------|-----------------------------|
| 3/8 | 3/8 | 48 | 1/2 | B |
| 7/16 | 7/16 | 43 | 1/4 | C |
| 1/2 | 1/2 | 39 | 3/16 | C |
| 5/8 | 5/8 | 30 | 3/8 | F |
| 3/4 | 3/4 | 25 | 1/2 | F |
| 1 | 1 | 8 | 7/8 | BB |
| 1 1/4 | 1 1/4 | 3 | 1 1/2 | GG |
| 1 1/2 | 1 1/2 | 1 | 1 3/4 | HH |
| 1 3/4 | 1 3/4 | B | 2 | II |
| 2 | 2 | E | 3/4 | JJ |

A Table of Center Hole Sizes for Various Sizes of Stock.

the lines drawn or scratched can be easily identified. In Fig. 3 is shown the operation of applying a coating of chalk. This is a common shop practice, and it is one of several ways of coating jobs when laying out. After the chalk has been thoroughly applied, rub smooth with the fingers and dust off the loose particles. This will make a nice, even surface for the layout.

Locating Center of the Job.

The center of the stock can be determined by using the center head, hermaphrodite calipers and the surface gage, Fig. 2. In Fig. 4 is shown how the center is being found by using the center head. In using this tool, push the limbs firmly against the stock and, with a scriber, mark lines at right angles to each other. When these lines intersect, the center of the stock will be found as shown in Fig. 5. This is now ready to be spotted for drilling.

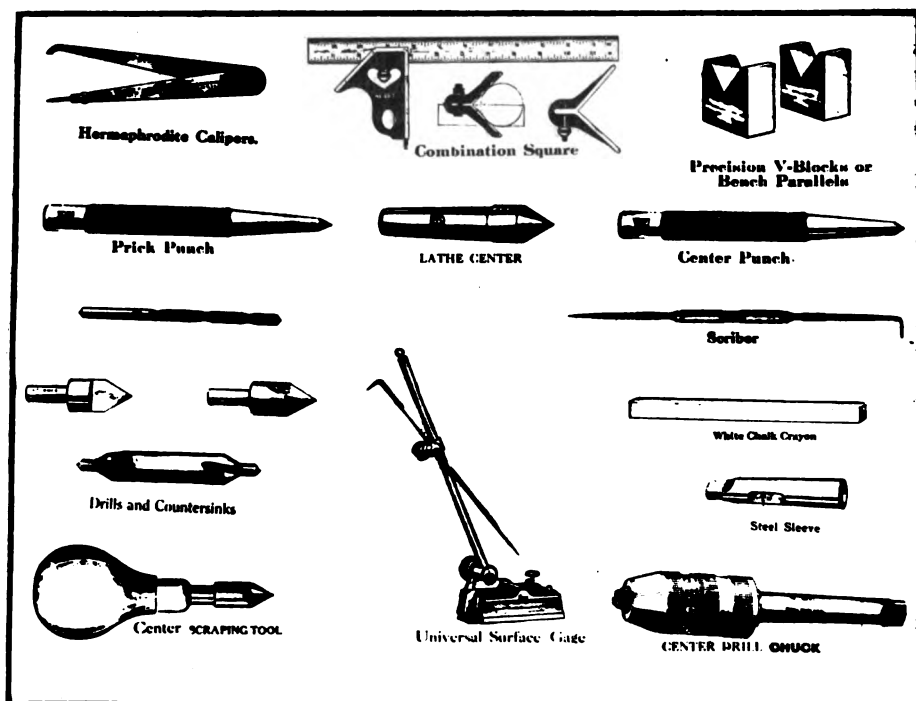


Fig. 2. Tradesmen Have Developed Many Tools for Locating and Drilling Center Holes.



Fig. 3. Applying the Chalk Coating.

In Fig. 6 is shown another method of locating the center with the hermaphrodite calipers. This tool is used on several styles of layout jobs, especially those which must be measured from edges. In using this tool to establish center holes, set the calipers to the approximate radius of the piece.

The caliper leg of the tool should be held with one hand against the stock. With the other hand, swing the divider leg of the caliper across the stock, making an arc. Repeat this operation on quarters of

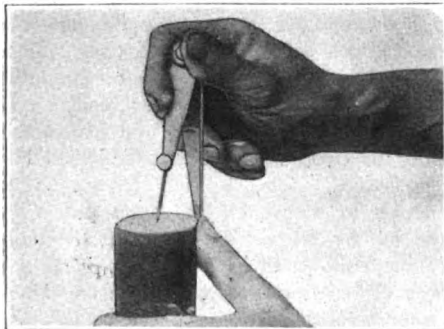


Fig. 6. Locating Center with Hermaphrodite Calipers.

the circumference. The four arcs will form a partial square, the center of which is the center of the stock.

The surface gage shown in use in Fig. 7 is used not only on this style of work but on many lathe operations as well. In finding the center with this tool, lay the stock to be centered on V-blocks, adjust the scriber on the surface gage to an approximate center and scribe the line. Turn the stock around a quarter or 45 degrees and scribe another line. Repeat until four lines have been drawn. The center of the

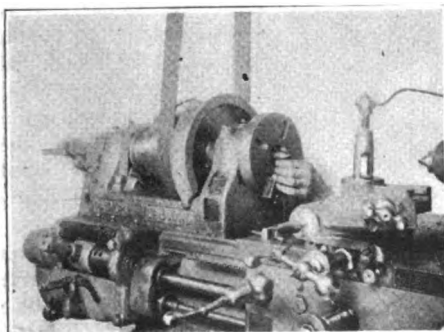


Fig. 9. Showing Method of Removing the Live Center.

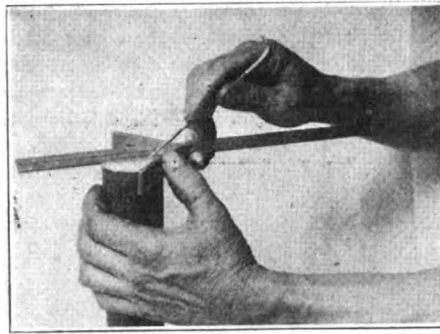


Fig. 4. Finding Center with Center Head.

small square made by this layout line is the center of the stock.

When a job that has an uneven surface must be laid out—for example, a valve tappet or push-rod forging—the surface gage is the only dependable tool that can be used. The forging is placed in V-blocks and the centers on both ends are established. By doing this type of job in this manner, you are absolutely sure to have enough material to finish the job to size.

The center of the stock being found,

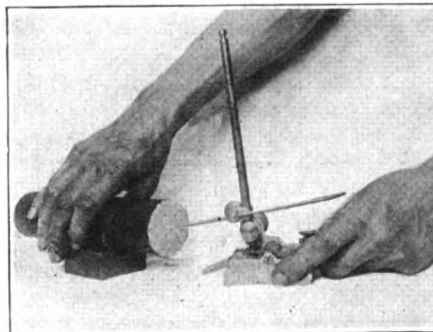


Fig. 7. Surface Gage Used for Many Lathe Operations.

the next operation is to establish the center for drilling. With a center punch, as shown in Fig. 8, a center spot is made to center the drill to the proper location. A reference to Fig. 2 shows a prick punch and center punch which are the common tools used to establish hole centers for drilling.

The prick punch is usually used on layout work to establish layout lines and hole locations. It is a finer pointed tool than the center punch and usually is not large enough to center stock for drilling. Fre-

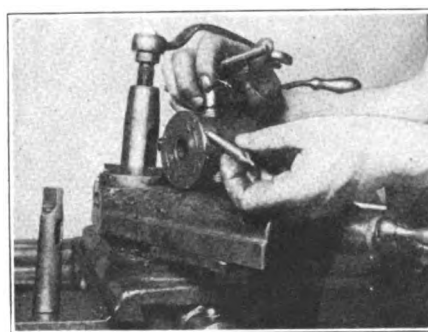


Fig. 10. How Drill Is Placed in Drill Chuck for Centering Job.

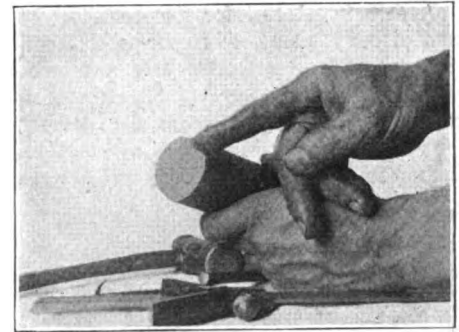


Fig. 5. Intersecting Lines Show Stock Center

quently the layout is established by using the prick punch and later, after checking, the drilling centers are enlarged by using the center punch.

Drilling the Center Holes on the Lathe.

In doing a drilling job on the lathe, the live center is removed as shown in Fig. 9 and a drill chuck is substituted in its place. It is a very easy matter to remove a live center from a hollow spindle lathe. A rod is placed in the spindle and is bumped against the center, forcing it from the lathe spindle. Hold the center as shown in this

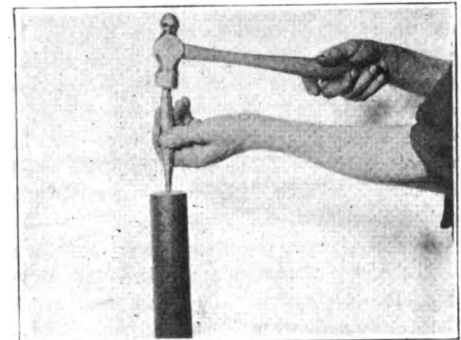


Fig. 8. Center Spot for Centering Drill Made With Center Punch.

view, so that, when it is forced out, it will not drop on the ways of the machine and damage the center point as well as the lathe shears.

A very common practice among the less experienced lathe operators is to hammer lightly on the edge of the center, thus jarring it from the fit in the spindle. This is very hard and unnecessary service on the lathe, as well as the center. One quick bump with the spindle rod on the end of the center forces it free from the spindle without any unnecessary side jarring.

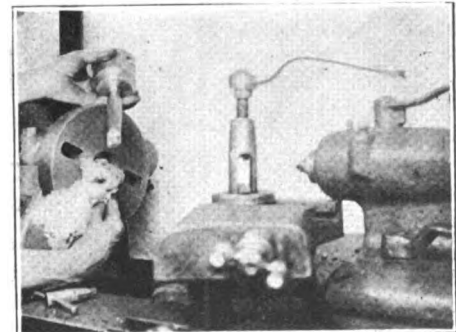


Fig. 11. Sleeve Placed on Chuck So It Will Fit Into Spindle.

A drill is selected for the centering job and placed in the drill chuck as shown in Fig. 10. The combination drill and countersink is shown ready to be clamped in the drill chuck. To obtain the sizes of center holes for various sizes of stock refer to the table. This table gives letter

spindle with a quick thrust or push.

To drill and countersink the center holes in the job, adjust the tail stock of the lathe to give an inch or two of clearance between the point of the drill and the end of the stock. The stock is then placed as shown in Fig. 12 and the lathe started,

countersink with the countersinking tool shown in Fig. 2.

It is in this operation of drilling that many improper center holes are made—refer to Fig. 1 where four improperly drilled center holes are shown. These are not uncommon at all and it is just this type of

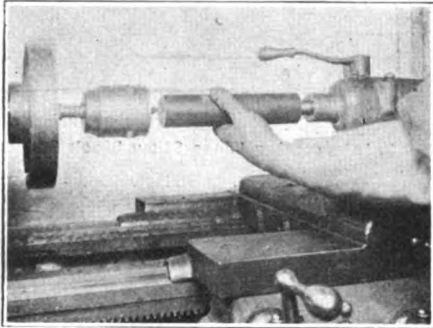


Fig. 12. Feed Work Against the Drill with the Tail-stock Center.

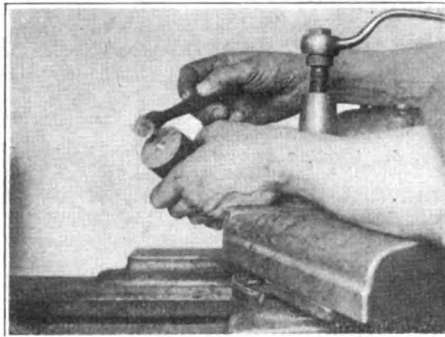


Fig. 13. Placing Lubricant In the Hole.

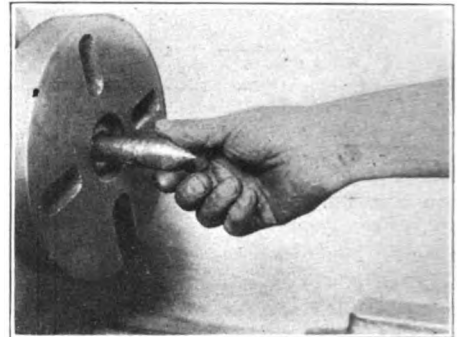


Fig. 14. Checking Position of Center.

sizes of the combination drill and countersink used in the various sizes of stock and also the sizes necessary when drilling the center holes with a common drill and countersinking with the plain countersink.

The combination drill and countersink is not an expensive tool to add to the list of effective tools for the shop. Four to six sizes are sufficient in fact. Some jobbing shops could get along very nicely with three sizes—C, F and HH—which, as a reference to the table will show, are used on sizes 7/16-inch, 1/2-inch, 5/8-inch, 3/4-inch and 1 1/2 inches.

The cheapest style of these combination drills is the double-pointed drill shown in Fig. 10. Oftentimes shops use the center drill provided with a taper shank. This shank is unnecessary, as a chuck such as shown in the illustration will hold the straight drill securely. As the cost for the two styles is about the same, the advantages gained by using the drill are obvious.

Clean out the spindle hole thoroughly before the drill chuck is put in place. Notice, in Fig. 11, the sleeve which has been placed on the chuck so it will fit into the spindle. The chuck should be securely placed in the spindle so it will run true as well as stay securely in position. Some operators, after placing the chuck and sleeve in the spindle, tap lightly with a soft hammer. This is not absolutely necessary as the chuck can be made to fit up snugly by being shoved into its place in the lathe

feeding the work against the drill with the tail-stock center.

The drill revolves and the work is stationary with the exception of the feeding motion. The stock can be prevented from turning by holding with the hand—it is not necessary when using so small a drill to provide other means.

If a center drill is broken off when drilling, many times it can be removed by sharp blows with the side and end of the piece of work. If this does not remove the drill, the job must be heated to anneal the drill. Another scheme is to place a few drops of nitric acid in the hole around the broken drill. This will attack the steel and loosen up the drill. It can then be removed.

When a center is required, and a combination drill is not at hand, drill a hole the proper size and depth indicated in the table, Fig. 1. After the hole is drilled,

work that will spoil the whole job. No true job can be turned on centers such as are shown here. When the center hole is reamed too deep it causes the stock to wear unevenly on the sharp edge, making the stock run eccentric between the centers.

The improper reaming angle has the same effect, only not quite as bad. When the hole is not reamed enough, the lathe center is not given the proper bearing. It is this kind of center hole that causes the work to jump out of the lathe when being turned. The bearing is not great enough to withstand the strain put upon the job by the cutting tool. In the next example shown in Fig. 1, the hole has not been drilled deep enough to give the lathe-center point a clearance.

This kind of centering is due to the drill point on the combination drill and countersink being resharpened so many times that

it is so short the proper depth cannot be secured. This, also, can be caused by not drilling deep enough when using the standard twist drill. The importance of a correct center has already been stated as a prime essential in good lathe work. Compare the correct center hole as shown in Fig. 1 with the others shown, and the advantages that are gained by using a center hole of the proper depth and angle can be easily seen.

After the hole has been drilled, place lubricant in the hole as shown in Fig. 13. These center holes must be lubricated

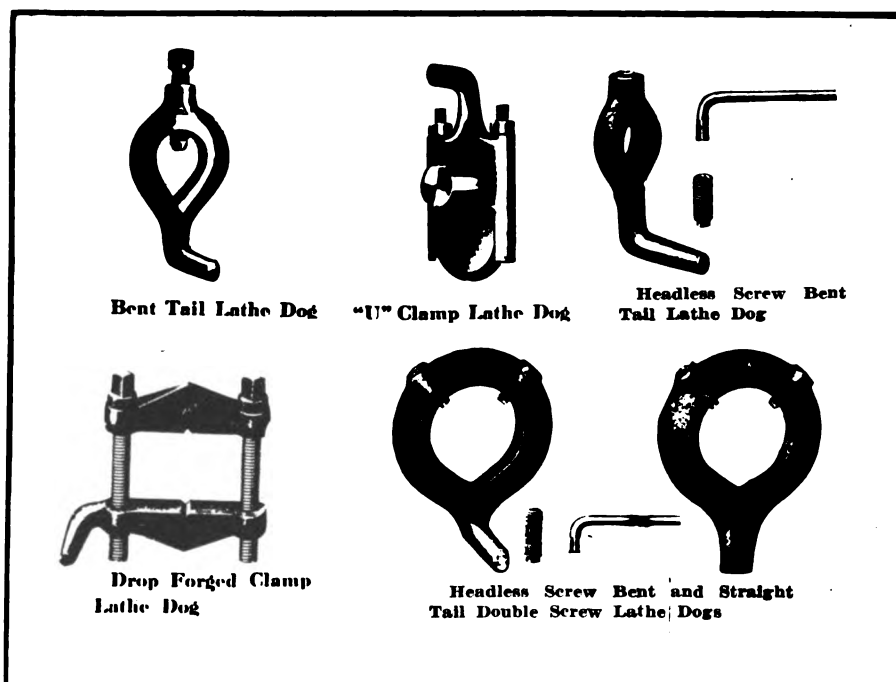


Fig. 15. Lathe Dogs are Made Up In Several Styles.

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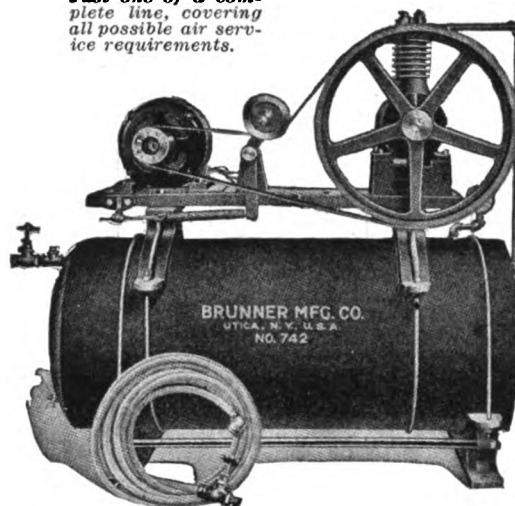
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when revolving on the dead center, as considerable friction is present between the lathe center and the job. Lathe centers—if not properly used—are very likely to become heated, causing the cutting or abrasion of the center as well as of the stock.



Fig. 16. Placing Lathe Dogs on the Work.

To prevent this heating, the following lubricants are recommended:

(a) Dry or powdered red lead, mixed with a good grade of mineral oil to the consistency of cream.

(b) White lead mixed with sperm oil, with enough graphite added to give the mixture a dark lead color. When necessary, thin by adding more oil.

(c) Graphite one part and tallow four parts—the two ingredients being thoroughly mixed.

The drill chuck is now removed and the live or spindle center is returned to its fit. This is done as shown in Fig. 14, where the operator is checking the position of the center before pushing into place. In order to always locate the center in the same position as it was when grinding, a locating mark should be made on the center and on the lathe spindle.

The center and the spindle hole must be thoroughly cleaned before putting back into place. If small chips of foreign substances lodge between the center and the spindle fit, the center will be certain to run off true, which causes a job that will give trouble when assembled.

The periphery of a properly-turned shaft

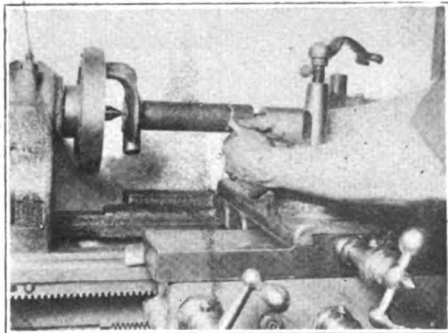


Fig. 17. Twisting to Determine Freeness of Tail of Dog in Lathe-Plate Slot.

is concentric with its center line. It is necessary, when turning a shaft over its entire length, to reverse the shaft in the lathe. If the live center is out of true, it will be noticed that, at the center of the work, it runs out one-half the amount the

live center is out of true. This kind of job is very common, and is the cause of so many difficulties occurring over the installation of a newly-machined job.

Jobs that are to be turned between the centers are driven by a lathe dog. This dog is engaged with the face plate on the spindle of the lathe. These dogs are made up in several styles, as a reference to Fig. 15 will show. The bent tail lathe dog is a drop forging and is provided with a square-headed dog point set-screw. This style of dog is dangerous to use in the lathe as the head of the set-screw projects out away from the work, ready to catch a loose sleeve and thus endangering the operator.

If this style of dog is provided with the safety set-screw, the dangerous feature is eliminated. The lathe dog provided with the headless screw is known to the trade as a safety lathe dog. Notice the broached square socket screw and wrench; also the heavy bosses on all these dogs. This is an important feature in lathe-dog design, as it permits the retapping of the hole so a larger screw can be substituted when needed.

The U-clamp lathe dog is used on light tubing and other finished stock. Its design permits a more equal distribution of pressure for holding the stock. When turning square stock it is not necessary to have a clamp lathe dog but this style is considered superior by many tool makers and machinists for round and square stock.

For turning large work the double screw dog is used. It is convenient to have this style of dog with the straight and bent tail, as it is much easier to fit to the face plate of the lathe for driving the job. Lathe dogs are placed on the work as shown in Fig. 16.

The set-screw in the dog should be tightened up firmly against the stock. On rough stock the screw is permitted to tighten directly on the stock but, when the dog is being placed on a finished surface, it is the practice to protect this surface with a copper or lead sheet under the point of the screw. The tail of the dog is made to fit into the drive slots on the face plate.

In locating the dog on the stock, check its location to see if it will fit into the face plate without binding. If the tail of the dog does not fit freely in these slots, there is danger of throwing the work away from the center of the lathe. Lathe operators always see that the dog fits freely in the face plate.

Placing the Job Between the Centers.

The stock is now ready to be placed between the centers. This is done by placing the stock on the live center first and holding the material steady by supporting the arm on the cross-slide and advancing the dead center into the center hole. Observe that the dead center does not hit around the hole several times before it is finally in place. This dulls the point of the lathe center which makes it useless for small turning jobs. To avoid chattering

of the work, a close adjustment must be made of the tightening of the job between the lathe centers. This can be adjusted by advancing or withdrawing the tail-stock centers.

In Fig. 17 the operator is shown twist-

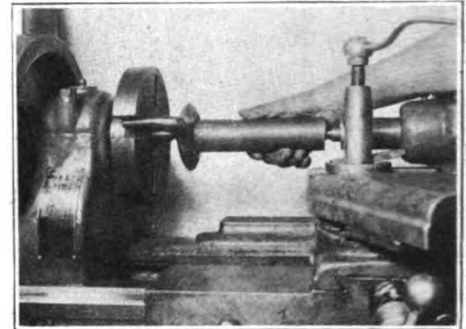


Fig. 18. Testing Job for Trueness.

ing the job to determine the freeness of the tail of the dog in the face-plate slot. See that there is no end-play between the centers, and adjust the tail-stock center until the desired freeness of the job is secured. The job must not be too tight between the centers, as there is danger of scoring the center holes and burning off the end of the tail-stock center. With the job properly adjusted between the centers, the next operation is to test the job for trueness.

One of the several methods of making this test is shown in Fig. 18. With a job revolving at a fair speed, the high side is determined by the chalk mark. This can also be done by placing a tool in the tool post and engaging the tool only enough to make proof marks. If the job is out considerably, the hole is scraped with the center scraper as shown in Fig. 19.

This operation is never necessary on a new job if the center of the stock has been properly located. It is, however, a very necessary operation on repair jobs when the center holes have been battered or burned over, caused by repeated hammerings re-

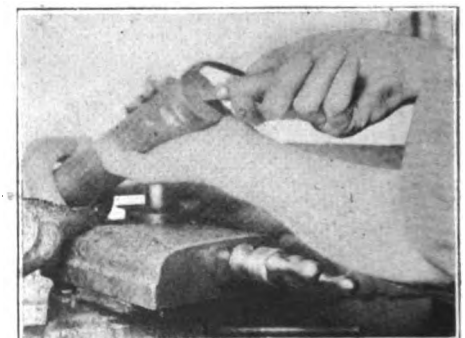
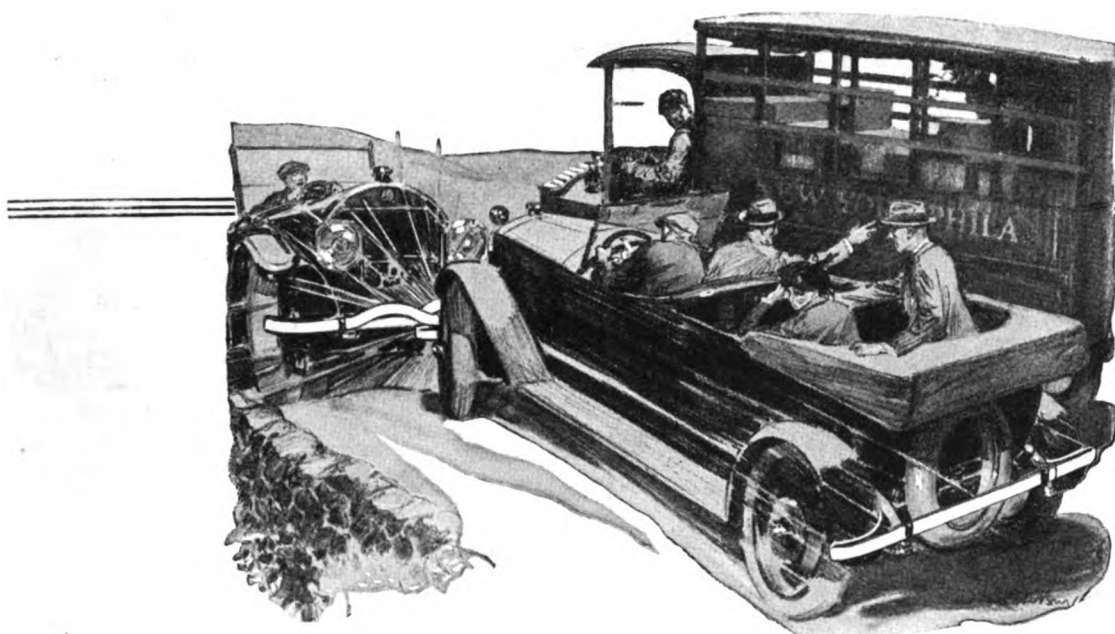


Fig. 19. Scraping Out with Center Scraper.

ceived when removing the piece from the machine for repairs.

The center scraper is an unusually useful tool in general repairwork and should be found in the tool box of every mechanic. A good center scraper can be shaped from an old 8-inch mill file. It is not necessary

(Concluded on page 40.)



Nothing to do but *SMASH!*

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How Piston Rings Should Be Fitted

Failure of Engine to Give Additional Power and Good Compression After Installation of New Piston Rings May Not Be Due to Any Lack in the Rings But to Improper Fitting of the Rings—Tools and Methods That Are Helpful

By S. E. Gibbs

Probably no part of an internal combustion engine is more often improperly fitted and not understood by the average mechanic than the piston rings. Too many overhauling jobs, where new piston rings have been installed, do not show much, if any, additional power, and when the engine is turned over by hand the compression is poor.

Such cases are the result of the more or less common method of fitting rings which consists of making sure that there is sufficient clearance at the joint, that the ring will not bind in the groove of the piston, and trusting to luck that various surfaces will eventually wear down and form leak-proof joints. However, when rings are properly fitted, one will have difficulty in pushing the newly-fitted piston into the cylinder against compression or in pulling it out against the vacuum.

In a four or less cylinder engine each compression stroke can be felt distinctly when cranking by hand and, if the compression is measured by means of a gage, it will be found equal in all cylinders and near the factory specified compression. Such work, if other parts are in good condition, will give a motor a full measure of power and pep and will make the driver feel that his money was well spent, thus building up his confidence in the firm and its workmen who did the job.

Many types of piston rings are to be had and it would be impossible to consider each detail in regard to fitting all types of rings.

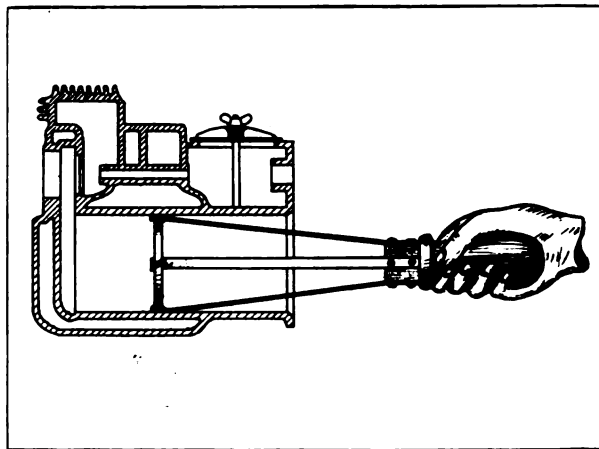


Fig. 2. Handy Tool for Testing Ring at Various Points.

but there are general points in regard to fitting rings that are common to types. Probably the greatest difference is in the number of pieces there is in the ring. Most engines are equipped at the factory with plain snap rings having either step or diag-

onal joints, so these types can be taken up in detail and reference made to other types as we progress.

As the rings are fitted when cold, an allowance must be made for expansion when fitting the joints. This allowance—or clearance as it is often called—depends upon the size of the cylinder, the cooling system, and the type of piston. An engine that normally runs hot, or which has pistons that do not cool properly, will require a slightly greater piston-ring clearance than one that cools easily. Three hundred degrees change of temperature is about the average difference in temperature of the rings, caused by running the engine.

The clearance should be 0.00000556 times the circumference times rise in temperature. It can be expressed as a formula as follows: $\text{Clearance} = 0.00000556 \times \text{diameter} \times 3.1416 \times 300$.

When a diagonal joint is used, the clearance should be measured along the top or bottom of the ring instead of between the faces of the joint. However, it is easier to measure the latter distance with a thickness gage, so the clearance is often expressed in such terms. If the clearance, as found in the formula just given, is multiplied by the sine of the angle at which the joint is cut, the distance from face to face will be obtained. As the joint is generally cut at an angle of 45 degrees, the sine or figure to use is 0.707.

The joint should be fitted by filing, but care should be taken to keep the faces of the joint straight and parallel to each other. The various defects often caused by faulty filing of the joints are shown in Fig. 1 and one can easily see how each defect would prevent the joint from being gas or air tight.

When filing the ring, it should be held in a special clamp or a vise that has been provided with soft jaws. As a ring is easily broken, care must be exercised when clamping the ring. The joint should be laid out carefully so the workman will have a line to which to work. A few

drops of copper-sulfate, placed upon the surface of the ring, will form a copper plating that can be marked with a scriber. In this way a protractor can be used when marking out the work.

There are three surfaces in the joint of

a step-cut ring to be fitted. As the sides of the ring were cut so the ring would be the correct thickness at the joint, they should not be tampered with. The ends should each be filed the same amount and

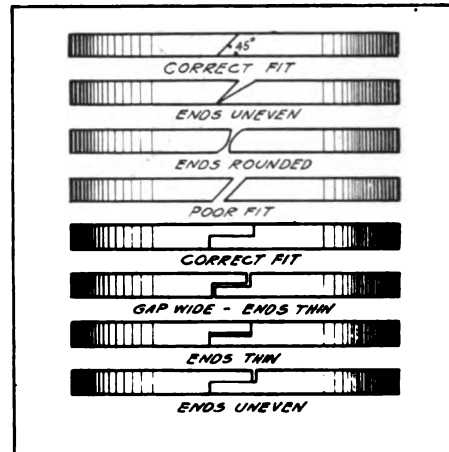


Fig. 1. Faulty Filing of Joints.

at right angles to the sides of the ring.

When new or refinished cylinders are being fitted, the ring can be fitted at any point in the cylinder, the only precaution being that the ring is held parallel to the top or bottom of the cylinder, or at right angles to the sides. Usually a piston is placed in the cylinder and the ring is placed against it to assure a correct position while the measurements are being made.

When fitting a ring to a worn cylinder it is necessary to test the clearance at various points, as there must be sufficient clearance at the smallest part of the cylinder. A handy tool for testing the ring at various points is shown in Fig. 2. The snap rings can be used in a slightly tapered cylinder but will not be of much service if the cylinder is worn out of round. The joints would be too wide at the larger portions and, naturally, more or less leakage would result with a step-cut or diagonal type joint when fitted to tapered cylinders.

Many of the special types of rings have joints which are leak-proof, even when there is a comparatively wide opening, and so do not have to be fitted as carefully as the simpler ring and are much better adapted to a job where the cylinder is somewhat tapered.

Some special type ring manufacturers, especially those who make multiple-piece rings, claim their rings will give good results in slightly out-of-round cylinders. A ring can be tested in this respect by placing a very thin coat of Prussian blue on the

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cylinder and moving the ring back and forth a few times. The fact that the step-cut or diagonal joint ring will give good service in a true cylinder and is cheap accounts for their use in many new engines.

The fact that the special rings often prove more efficient in worn cylinders and generally require less fitting accounts for their popularity in the service stations. Probably if special rings were installed when the cylinder was true, longer service could be had without oil pumping and compression leaks. At any rate, there is room for the use of plenty of common sense in the selection of the ring that will be best suited to a particular job.

The next step is to fit the ring to the groove in which it is to be used. If the piston has been in use, the groove should be thoroughly cleaned and inspected before an attempt to fit the ring is made. The sides of the groove often become worn and, therefore, should be trued up in a lathe before rings are fitted. When testing the width of the ring, it should be rolled around the piston in the groove rather than placing the ring on the piston, as much more accurate results can be obtained and much time is saved.

If the ruling is found to be too wide and binds in the groove, it should be dressed down by grinding one side of it. A file should never be used for this kind of work, as it is impossible to do accurate work regardless of the skill of the workman. Even when grinding it is almost impossible to get as accurate a surface as the machined surface so the grinding is done on but one side so that one true side will be left.

Several methods of grinding are common and all will give good results if done carefully. A piece of fine emery cloth is often fastened to a smooth board or other surface and the ring laid flat on the cloth and ground as shown in Fig. 3. A surface plate and grinding compound is supposed to give

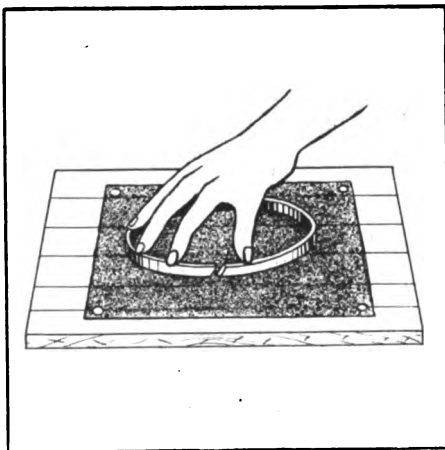


Fig. 3. Grinding the Ring on Piece of Fine Emery Paper Fastened to Smooth Board.

slightly more accurate results, but the plate is soon ruined by this operation.

If a comparatively soft abrasive is used, the work can be done on a piece of plate glass. Rings are often tested for trueness

of the side by laying the ring upon a piece of plate glass that is coated with a thin layer of Prussian blue and noting the surface of the ring, which is colored from contact with the smooth surface.

Not only is compression lost by leaks between the rings and the cylinder walls and at the joints, but one of the greatest common losses is caused by gases finding their way around behind the ring. This loss is often the cause of a new set of rings failing to give satisfactory service. On the explosion stroke, for instance, the rings are held against the bottom of the grooves by the pressure of the gases so there is at least a little space at the top side of the ring where the gases can get behind the ring. If the ring does not fit the bottom side of the groove and form an air-tight joint, the gases will easily escape.

Each ring should be lapped into the groove in which it is to be used. Some mechanics lap both sides, while others lap but one side—that is, the bottom side of the top ring and the top side of the bottom ring and usually the bottom side of the center ring. If the third ring is below the piston pin, the second ring should be fitted on the top side as its greatest use will be in drawing in the charge. The true surface or machined surface should be used at the side which is to be carefully fitted, as but a small amount of lapping will produce a very good surface.

This method is not practiced in many shops, but one fair trial will convince any workman that it is not a theoretical hobby and is a practical method that gets results. The only real objection that can be raised is that it will require too much time, but a good ring and true groove will require only a few seconds' lapping to give an almost perfect seating. With a little experience and proper equipment a good workman can do the job in a jiffy.

A tool for holding the ring while lapping is shown in Fig. 4. It can be made in any shop, and one size will serve for several sizes of rings. A very fine-grained grinding compound should be used when lapping rings. Ground glass or pumice stone mixed with thin oil will serve very well for such work. As these compounds cut or rather polish well for a short time and then wear out and become almost harmless, there is not much danger from using them in the cylinders even though the compound might not all be removed when cleaning.

However, after lapping, all the surfaces should be carefully washed with gasoline and every effort put forth to remove all traces of the grinding compound. The lapping is only a polishing process and it should not be used for removing more than a fraction of a thousandth of material, so but a little lapping should be done on each joint or surface. Too much lapping would cause the ring to be loose in the groove and, therefore, defective. A slight allowance should be made for the lapping, especially if both sides are to be lapped.

The next step is to fit the ring to the

cylinder. This is not a difficult task when a new cylinder and ring is used, as both are likely to be true. However, it will take several hours' running to wear the surface of the cylinder and ring to a smooth polished surface unless they are lapped when

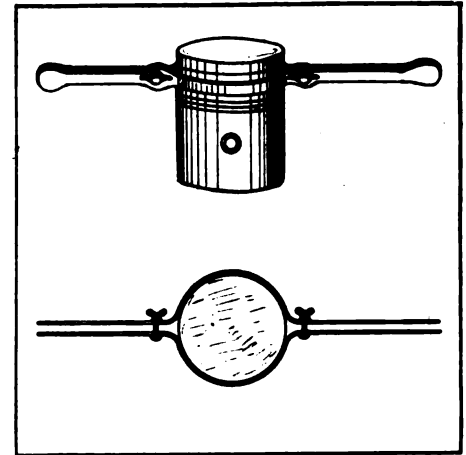


Fig. 4. Holds Ring While Lapping.

fitting. The special self-seating or quick-seating rings are, in general, very good but will not be harmed by a little lapping.

When such rings are to be used, it is well to polish the cylinder by lapping it with the piston, without rings, until it is almost finished and then giving the rings but a few rubs. Slightly worn cylinders can often be trued up to a fair degree of accuracy, but this should be done before the joints of the rings are fitted. In fact, it is well to fit the joints so that the ring will just go into the cylinder and then finish them after the rings have been lapped, as the metal worn away in the process will cause the clearance to increase. Thus, if the final fitting is done last, there is no danger of its being changed.

The rings may be lapped individually by means of the tool shown in Fig. 2, or by placing them on the piston. They should be moved back and forth, through the whole depth of the cylinder, with a slightly rotary motion. A compound similar to that used for lapping the rings into the grooves should be used. The same care should be used in cleaning the cylinder walls and pistons and rings. Lapping of the rings is a short job if the rings and cylinder are true.

The majority of the patented rings are not constructed so that they can be fitted to the cylinder. Many of them have joints which are good through a considerable variation, but most of them are made in standard oversizes, so the cylinders should be finished to one of these sizes.

The over sizes recommended by the S. A. E. are as follows:

| | |
|----------------------|-------|
| First oversize..... | 0.010 |
| Second oversize..... | 0.020 |
| Third oversize..... | 0.030 |
| Fourth oversize..... | 0.040 |

Some other recommendations or sizes manufactured by some companies are:

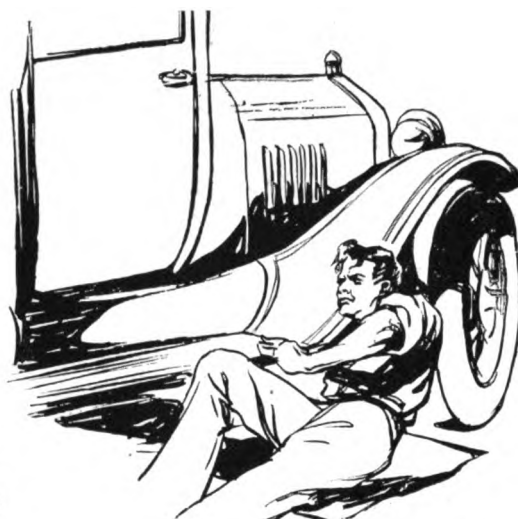
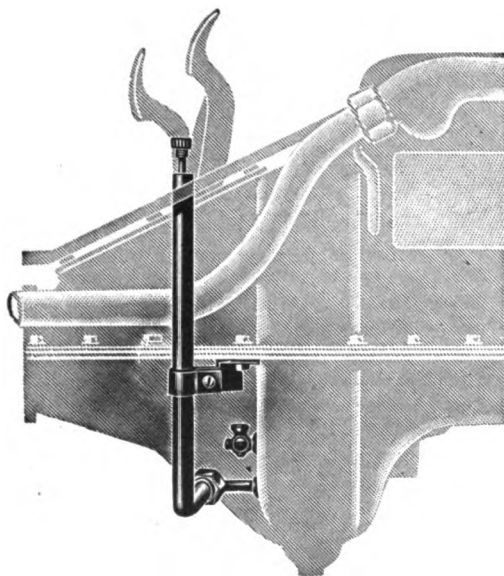
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0.0025, 0.005, and then each size five-thousandths larger than the next smaller one.

Fitting rings accurately will not only insure good compression, abundant power and low oil consumption but will prevent a large portion of the ordinary carbon deposits and keep the crankcase dilution to a minimum. Such rings show results at once, and the driver does not have to drive the car a few hundred miles before the rings wear down.

There is never the danger of the fit being too loose, as might be the case if a cylinder were roughly bored and the rings not finished smooth. The psychological effect of a job that speaks for itself at once, and continues to do so, must not be overlooked in these days when service must be sold under strong competition.

Probably some service managers spend but little time in fitting rings because they are afraid their customers will not stand for any more time charges. However, if one explains to the customer the cost of tearing down a motor to get at the rings, almost any reasonable man will pay a little more for a first-class job if he is sure he will get results for a good many thousand miles and save the cost in gasoline and oil. Anyhow, it is quality work that will eventually prove the most profitable. With modern equipment and skilled men, quality work can be turned out much cheaper than a quantity of poor work is being turned out.

A. E. A. SUMMER CONVENTION BEST YET.

(Concluded from page 20.)

tendance at each meeting down to the present time, together with pictures of the association's latest accomplishments—universal catalog, standard salesmen's binder and the A. E. A. handbook.

A 32-page "Shop Profits" book will be distributed to dealers and garagemen in all parts of the country. The "Ask 'Em to Buy" film will continue to be distributed, as well as the book, "A Greater Business," which was brought out last year.

Gordon Lee, chief of the Automotive Division, Bureau of Foreign and Domestic Commerce, Department of Commerce, attended the convention in the interest of Secretary of Commerce Hoover to promote greater and better business at home and abroad in automobile accessories.

Mr. Lee explained the functions of his department and told the convention of the desire of his department to co-operate in all matters with the members of the Automotive Equipment Association. He urged any automotive business man who is puzzled by anything regarding the government to write to the Automotive Division. This division, he explained, is the contact division between automotive business men and all departments of the government.

It has been decided that the show this fall will be for manufacturer and jobber members of the association only.

The operation of a permanent traffic department was agreed upon, the purpose of this permanent department being to audit and collect freight bills, appear before the classification committees in the interest of better classification of commodities in this industry, and to do those things which only a highly organized department can do and obtain the results called for by an organization of the scope, size and importance of the Automotive Equipment Association.

HOW FIRST LATHE JOB IS HANDLED.

(Concluded from page 34.)

to draw the temper on the file during the grinding operation.

With the job properly located between the lathe centers, it is now ready to be turned to the desired shape. This is done by a tool which is placed in the tool post. Superintendents and foremen of machine departments in factories gage the ability of an operator by the way he grinds the tools used on the machine.

Massachusetts Court Rules Broker's Agency Not Exclusive Unless Stated.

(Concluded from page 27.)

was satisfactory to the seller, his commission was to be 10 per cent of the purchase price. In response to an advertisement of the plaintiff, one Ehrlick, offered \$4,500 which the defendant, upon notice of the offer, declined, saying that the plaintiff must get \$500 more.

The plaintiff had already received \$500 deposit from Ehrlick, who finally agreed to pay \$5,000 for the property. When the plaintiff informed the defendant that Ehrlick had signed an agreement to pay \$5,000, the defendant had already sold the garage to one Bell for \$4,000. The defendant consulted counsel and endeavored to have the sale to Bell abrogated. His efforts in this having proved unavailing, he declined to pay the plaintiff a commission on the grounds that the plaintiff's agency was not exclusive and that no commission had been earned.

From the evidence, it appeared that Ehrlick was not only ready and willing but was also able to buy and had agreed to purchase at the price named by the defendant. Because of this aspect, the presiding judge refused to order a decision for the defendant.

It was ruled, however, "that in giving a broker authority to sell his property upon terms stated but without expressly agreeing that such broker shall have exclusive right to sell, the owner of the car retained the right to effect the sale personally or through another broker."

Reckless Automobile Drivers to Be Given Name "Flivverboobs."

Reckless and careless drivers of automobiles are to be known as "flivverboobs,"

according to the decision reached by the judges deciding the American Automobile Association's contest to pick a name describing the reckless driver in the same manner that "jay-walker" describes the careless pedestrian.

The name was suggested by F. B. Simpson, of Cedar Rapids, Iowa, who will receive the \$25 in gold offered as a prize by the A. A. A.

More than 10,000 names were submitted in this contest and the suggestions came from all parts of the United States. The committee selected to pass on the suggestions consisted of Col. C. O. Sherrill, head of public buildings and grounds, Washington, D. C.; Dr. Frank W. Ballou, superintendent of public schools, Washington, D. C.; Inspector Albert J. Headley, head of the District of Columbia traffic department; Charles W. Semmes, president of the Semmes Motor Co., and Isaac Gans, prominent Washington business man.

The contest attracted nation-wide attention and the answers were of many varieties, including some who declared that it would be impossible to describe a reckless and careless driver in language that would go through the mails. The prize has been forwarded to Mr. Simpson.

Use of Dirty Water in Tractor Leads to Trouble.

Tractors cannot do the best work if they are supplied with dirty water. It is far better to spend a half-hour in getting clean water from the settling basin or house rather than to use ditch water.

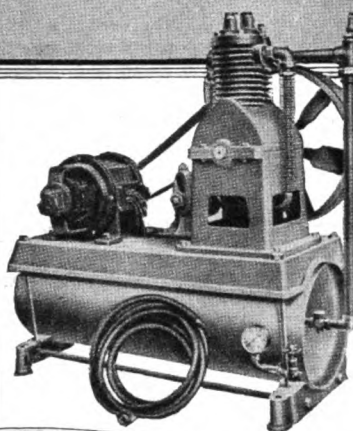
Hard water too is harmful because it deposits sediment which encrusts the metal surfaces. When dirty water must be used, strain it through a fine cloth. The use of alkaline water will in time clog up the system because of the deposits set free when the water is heated.

One way of preventing deposits is to add one-half teacupful of kerosene to each tank-radiator filling of water. Kerosene adheres to the metal surfaces and prevents the formation of scales. Boiler compounds can be used with local waters to remove the scale.

Speedometer Gears Must Be According to Tire Sizes.

When changing from normal size to oversize tires, it is necessary to change the speedometer gear if the instrument is to register absolute accuracy.

The rule to follow is that the number of teeth in the large speedometer gear—that is, the one attached to the road wheel—must be twice the diameter of the tire in inches. For instance, if the car is equipped with 32 by 3½-inch tires, the speedometer gear should have 64 teeth. But if an oversize tire—33 by 4—which fits the same wheel is put on, the large speedometer gear should be changed to a 66-tooth size.



CURTIS *Single Stage and Two-Stage* AIR COMPRESSORS

Curtis Single-Stage Compressors—the most popular everywhere. Have controlled splash oiling system—runs ten to fifteen times as long on same amount of oil. Fan flywheel—aims in keeping cylinder cool. Hand unloader—prevents blowing fuses and jumping belt. Head removable without loosening pipe connection. Also many other exclusive features. Several styles and sizes.

Curtis Two-Stage Compressors have same features that established our single-stage so strongly and in addition have all possible advantage of two-stage compression. Exclusive Aeroplane type COPPER intercooler with thin radiating fins rigidly attached assures fullest advantage of two-stage compression. Several styles—two capacities.

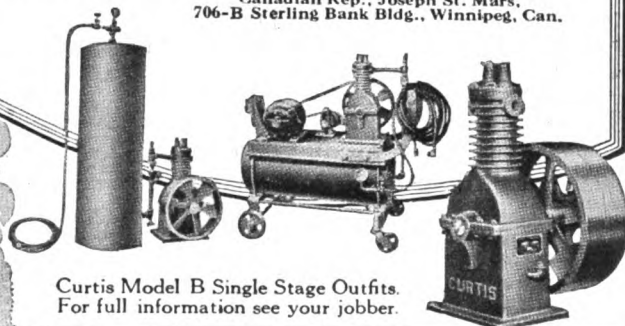
FREE
CURTIS' AIR
FREE FROM OIL

This Curtis Sign—14x20 inches—baked enamel on heavy steel. Furnished at small cost to users of Curtis Garage Air Compressors.

Curtis Pneumatic Machinery Co.
1515 Kienlen Ave. St. Louis, Mo.

Branch Office:
530-U Hudson Terminal, New York City

Canadian Rep., Joseph St. Mars,
706-B Sterling Bank Bldg., Winnipeg, Can.



Curtis Model B Single Stage Outfits.
For full information see your jobber.

The Original Hough Townplate— PRONOUNCED "HUFF"



Every car owner in every locality is a prospect. Hundreds of dealers are finding the Hough Townplate their most profitable accessory. Endorsed by Chambers of Commerce and Business Men's Associations.

A Traveling Advertisement for You

Hough Townplates, bearing the name of your town, are 2x10, 2x12 or 2x14" in size, handsomely embossed and enameled in two colors to match 1922 state license plates. Securely attached with Hough patent fasteners.

Made up in any quantities of 25 pairs or more. Put our attractive Hough Townplate display card in your window or on a counter and every motorist will purchase the "Hough" to boost the home town. Retail for \$1.00. 100% profit for you on every sale.

Over 400,000 on cars this year.

Write for complete particulars.

FRANK G. HOUGH & CO.

ROOM 300

650 N. Michigan Ave.

CHICAGO

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SIOUX CITY

ROSE Supremacy Is No Accident

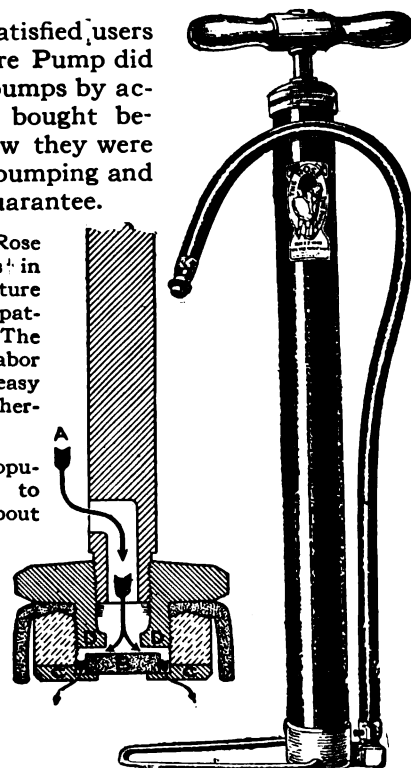
Three million satisfied users of the Rose Tire Pump did not buy their pumps by accident. They bought because they knew they were buying easier pumping and a Five Year Guarantee.

The secret of Rose supremacy lies in careful manufacture and the famous patented valve. The valve is the labor saver. It makes easy work out of an otherwise tedious job.

Profit by Rose popularity. Ask 'em to buy and tell 'em about the valve.

**Frank Rose
Mfg. Co.**

HASTINGS
NEBR.

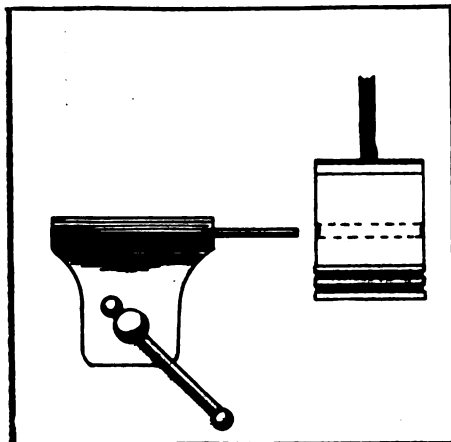


Practical Hints for Shop Mechanics

Avoids Twisting Connecting Rods.

The cause of many mysterious knocks in an automobile engine is frequently found to be in the improper replacement of the rod or wrist-pin.

The usual procedure, after the piston and



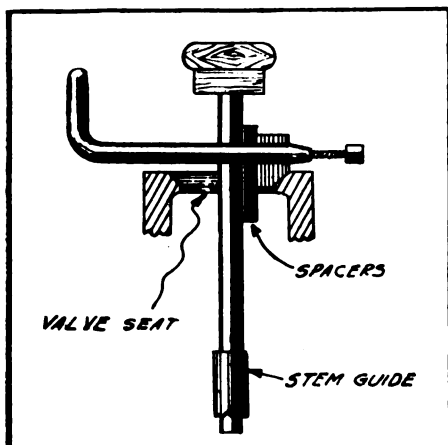
Helps When Replacing Connecting Rod.

connecting-rod have been removed from the motor, is to clamp the rod, piston down, in the vise and loosen or tighten the wrist-pin clamp screw with a long leverage wrench. This invariably twists the rod, which results in a knock that is hard to locate.

To avoid this, a punch or a piece of rod iron that will slip through the inside of the wrist-pin is clamped horizontally in the vise with three or four inches of one end projecting to one side. The wrist-pin, with the rod and piston assembled, is slipped over this and as much pressure as desired may be applied without straining the rod.—L. M. T., Ill.

Improvised Valve-Seat Refacer.

Most garagemen have among their tool equipment valve-seat reamers for refacing the sizes of valves commonly found in



Works Well When Valves Are Odd Size.

their repairwork. Occasionally the mechanic is called upon to reface the valve seats of an engine in which the valves are of an odd size. On such a job, the improvised refacer shown in the illustration will work quite well.

A rod about 12 inches long, and of a diameter that is a sliding fit in the valve-stem seat is used as a pilot for the cutter. A tool-steel cutter is hardened and ground to fit the angle of the valve seat.

This is spaced at the correct distance from the pilot with metal blocks, and the whole assembly is clamped together with a medium-sized lathe dog. The arm of the dog makes a convenient handle for turning the tool and a small block of wood resting on the upper end of the pilot bar provides a place to apply the downward pressure.—L. R. B., Iowa.

Prevents Dirty Spark-Plugs.

If the cylinders of your motor car pump oil and continually foul the spark-plugs, one simple and effective way of preventing this is to secure a 45-degree, 1/2-inch street L from any plumbing establishment. Merely

ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

screw this into the cylinder head instead of the plug. Then screw the plug into the L, attach the wire to it, and you are ready to go again.—G. F. S., Ill.

Generator Output Regulator.

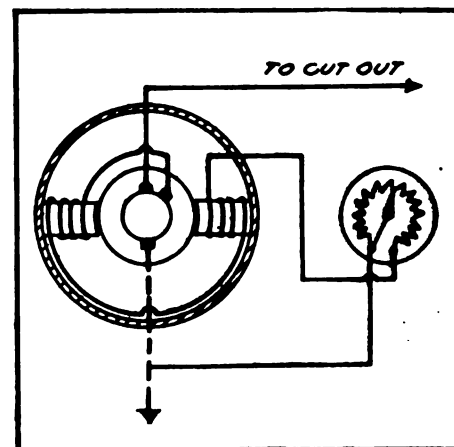
By connecting a rheostat in series with the field circuit, as shown in the illustration, the current output of the generator can be regulated to suit all conditions.

If a third-brush generator is used, it should be regulated to give its maximum output, after which it can be regulated with the field rheostat.

When making a long run on a hot day, the output can be cut down to as low as

two amperes, and when short runs are made the output can be increased as desired.

The rheostat, which is located on the instrument board, should have a capacity of about six amperes and be of about 12 ohms' resistance. I used an ordinary rheostat de-



Protects Battery From Overcharge.

signed for wireless apparatus. This is a great help in protecting the battery from overcharge.—P. A. B., Pa.

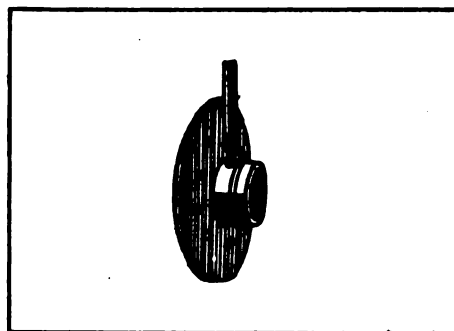
Self Opening Pliers.

For use in the shop where tires are changed, a pair of pliers with handles fitted with springs will be found very handy. Take a short length of expansion spring and slip over the handles so the spring will be compressed between them when they are brought together.


This will cause the jaws to relax their grip when the grip on the handles is relaxed. This is very handy for unscrewing valve caps, etc.—R. W. T., Mo.


To Remove Stubborn Races.

To remove stubborn races or roller-bearing cups from hubs, drill a 1/4-inch or 5/8-inch hole through the hub to the race, as shown in the illustration, and you can easily drive out the race or cup with a pointed punch and a hammer.—B. J. B., Iowa.



Drive Out Race With Pointed Punch.





Flexlume Signs--

Advertising at Low Cost

A Flexlume Electric Sign will tell your story to thousands at a cost of only a few cents a day. They are the kind with the *raised*, snow-white glass letters standing out from a dark background—perfect day signs as well as night signs. Flexlumes have greatest reading distance, lowest upkeep cost, most artistic designs.

*Let us send you a sketch showing a
Flexlume to meet **your** particular needs*

FLEXLUME CORPORATION

25 Kail Street BUFFALO, N. Y.

Flexlumes---Electric Signs Made Only By The Flexlume Corporation.

THERE HE GOES

Another good customer lost because the old compressor has fallen down on the job just when he wanted his tires filled.

WELL, YOU DON'T HAVE TO LET HIM GO.

Hold your old customers and make new ones with a dependable air supply—



GLOBE SIMPLEX TWO-STAGE COMPRESSOR

Guaranteed to Pump more air for the amount of current consumed than any other type of compressor on the market. High in efficiency—Low in operating cost—Simple in construction—Reasonable in price and on the job all the time.

DON'T WAIT. BUY NOW AND LET THE SIMPLEX END YOUR AIR TROUBLES.

GLOBE MANUFACTURING CO.
Battle Creek, Mich.

BLACK & WHITE

VALVE GRINDING COMPOUND

THE FASTEST CUTTING OF ALL COMPOUNDS

BLACK & WHITE combines rapid cutting and smooth finishing qualities to a remarkable degree. The result of long experimentation—composed of several grades of abrasives and a superior grade of petroleum jelly. Cuts and polishes valves and valve seats instead of tearing the steel. Removes pits, carbon spots and leaves valve seats clean and true. Put BLACK & WHITE to the test. Secure a 50c 5 oz. can at half price. Fill out coupon below and attach to your letterhead or business card and mail with 25c in stamps—today.

Distributors wanted. A splendid proposition! Write for particulars.

ABRASIVES SALES CORP.

17 East 49th St. New York City
FACTORY, MT. VERNON, N. Y.

Name

Address

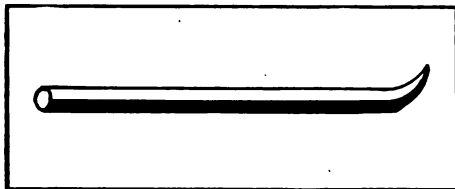
City..... State.....

Jobber

For Removing Roller-Bearing Race.

It is quite a job to remove the worn bearing race from a wheel with the ordinary punch, but one may be made for the purpose that will work nicely.

Take a good piece of tool steel and grind



For Removing Worn Bearing Race.

or forge it into the shape shown in the illustration. Be sure to use a good grade of steel, or it will not stand the strain of hammering. The offset on the end of this punch will set on the race and it can be driven out.—D. & F., Mo.

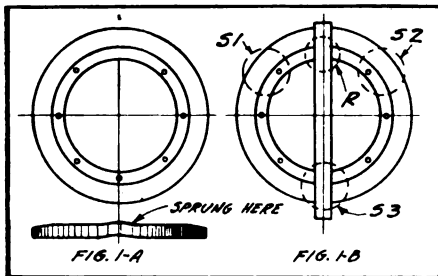
* * *

An Unusual Press Job.

We have just repaired a rear axle which suffered a rather peculiar accident. One of the rivets which secured the large ring gear to the differential housing flange broke in two, was picked up by the ring gear, and passed between the ring gear and the drive pinion. No teeth of either the pinion or ring gear were damaged, but the ring gear was sprung in two places.

At first, a new gear appeared to be the only remedy. However, by using our shop press we overcame the difficulty quite nicely. Fig. 1-A shows, in an exaggerated form, one of the places where the gear was sprung. In order to make the gear true, we placed it upon the press, supporting it at three points as shown at S_1 , S_2 and S_3 in Fig. 1-B.

Upon the gear was placed a piece of steel 3 inches by $\frac{1}{2}$ -inch, this steel bearing upon a tooth of the gear, midway between the supporting points S_1 and S_2 , between which was the spot which was sprung. The other end of this steel bar rested on



Repairing Gear With Shop Press.

a tooth directly over the supporting point S_2 , and the ram of the press was brought down to bear up on the steel bar at the position marked R.

We used a face plate from a 16-inch lathe as a surface plate to determine when the gear was true, and less than 15 minutes of work served to remove all traces of inaccuracy in the gear. It will

be noted that, with the parts arranged as shown, nearly all the pressure of the press is brought to bear upon the sprung portion of the gear and a comparatively light pressure will remove the inaccuracy. This use of the press saved buying a new ring gear at quite a considerable expense, as the gear was for a large seven-passenger touring car.—E. K., Minn.

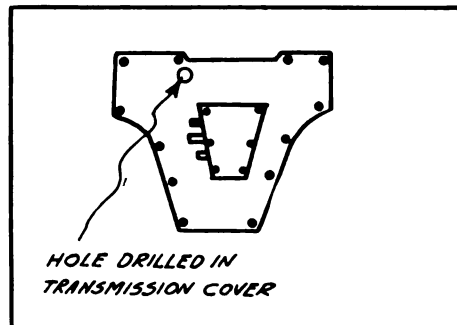
* * *

Cleaning the Ford Oil Pipe.

A Ford oil pipe can be cleaned, without taking the engine out, by removing the transmission cover and inserting flexible wire to loosen the deposits and then blowing out with an air-line hose nozzled with a 5/16-inch, tapered, copper pipe.

This is a quick and positive way of cleaning the Ford oil pipe without taking the engine out. Take the radiator and cylinder front cover and the large cam gear off. Then take a piece of thin, flexible wire and shove it back and forth and clear through the pipe to loosen grease and gatherings. Blow through with air-line hose nozzled with 5/16-inch, tapered, copper pipe.

A third method is as follows: Drill a hole on top of the transmission cover, as shown in the illustration, to fit $\frac{3}{8}$ -inch pipe, plug and tap it. Through this hole, flexible wire can be stuck in the oil pipe and the



Good Way to Clean Ford Oil Pipe.

grease and gatherings loosened and then blown out with air-line hose fitted with a tapered, 5/16-inch copper pipe.—B. J. B., Iowa.

* * *

Insulator for Plier Handles.

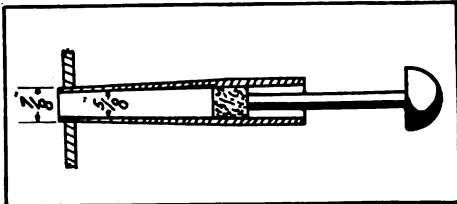
When working about the ignition of a car, the mechanic may accidentally touch a spark-plug terminal and get a very unpleasant shock. A common method of insulating the plier handles is to use friction tape, but the following is a better way of insulating:

Small rubber tubing, just large enough to fit the handles snugly, is secured. Cut off two pieces, slightly longer than the length of insulation wanted, and split one end of each for a short distance. Cement the plier handles and slip on the tubing, leaving the split ends projecting over the handles. Cement the splits inside and press together tightly, covering the ends of the handles entirely.—L. R. B., Iowa.

Handy Device for Small Garage.

New cork inserts in a clutch plate are difficult to install properly unless the clutch plate is equipped with a device for holding and compressing the cork.

A simple and inexpensive cork-inserting



Simple Cork-Inserting Machine.

machine can be made from a hollow tube, tapered both inside and outside so as to compress the cork when forced through the tube by means of a plunger.

Care must be taken to see that the cork protrudes an equal distance from either side of the plate.

These cork surfaces can be beveled up by means of a sheet of sandpaper placed on a plate or something of the kind.—H. J. W., Iowa.

* * *

Detecting Cracked Porcelains.

Spark-plugs which are to be cleaned may be tossed into a can of kerosene for a few hours. This loosens the carbon and makes cleaning easier. Then wipe dry and, if desired to test for invisible cracks, dip them in tire talc or talcum powder.

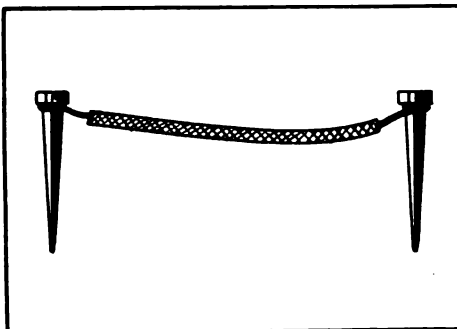
If cracks are present, the kerosene will dampen the talc and make a dark line. Such porcelains should be discarded.—R. W. T., Mo.

* * *

Battery Connector.

This connector is for use on the charging bench. The connection is always sure. Our battery man is using them and they have proved absolutely satisfactory.

Take two horseshoe nails and any length



Handy For Use on Charging Bench.

wire which is desired, cut back the insulation of the wire for about an inch at each end and solder the ends to the nails as shown in the sketch. Charge before putting the straps on the terminals and tap into the lead terminals, being careful to form a sure contact.—E. S., Iowa.

They Come to Me

I'm off the main highway, but I sell the goods because I have

National Guaranteed Coupon Books

My customers like the convenience of paying for petroleum products with coupons. They like the quick and accurate service. They like the saving where a discount is made for cash.

I profit because I have no bookkeeping to do. No more disputes with customers. And I get my money in advance.

YOU can sell NATIONAL GUARANTEED COUPON BOOKS for cash—or use them for charge business. Your sales will soar.

Start a coupon book campaign and they'll travel off the beaten path to buy from YOU.

There are some samples and quotations waiting for you at

National Checking Company

271 Chestnut Street
ST. PAUL MINN.



SH-H-H-H!

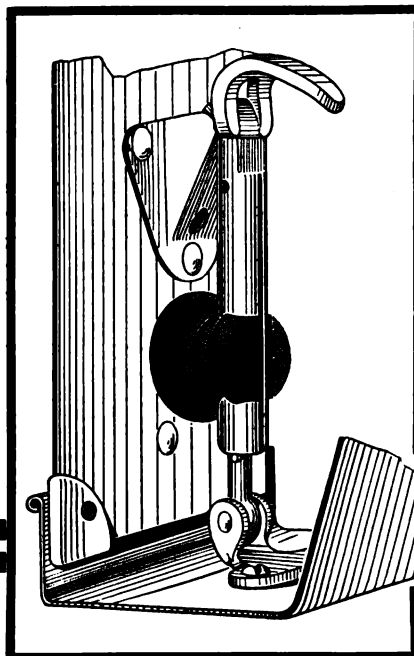
**Perfect Quiet. No More Hood Rattles.
The Jorgensen Hood-Silencer Stops Them Forever!**

Made of rubber in one piece, with hole in silencer on slant to conform with angle of hood-fasteners, and with vacuum cup at

one side which fits close to the hood, preventing shifting. The Jorgensen has nothing to get out of order, does not mar the finish of the car, and holds firm over the roughest roads. It is rightly named—a "silencer." Fits Dodge, Buick, Maxwell, Chevrolet, and other makes.

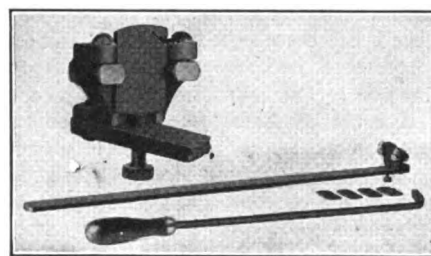
The touring season is on! Get a trial order today and reap the rewards from our fine dealer proposition.

H. G. Jorgensen
Hampton Road
Erie, Pa.



BIG PROFITS IN REPAIRING SCORED CYLINDERS

No secret or mystery with the TORIT process



TORIT SCORED CYLINDER TOOLS

(Adjustable blade holder magnified)

TORIT tools refinish the cylinder to the same bore and surface. No new pistons, no regrinding. Easy work, big pay. Get your outfit now.

Price of tools, as shown, with instructions.....\$10.00
Filling-in metal, per pound..... 3.50

ST. PAUL WELDING & MFG. CO. 165 W. 3rd St., St. Paul, Minn.
Mfrs. TORIT torches, generators, preheaters, etc.
Distributors REGO oxy-acetylene equipment.

Readers' Questions and Answers

Clutch Slipping.

I have a Crow Elkhart, model 33, with disk clutch which I have trouble to keep from slipping. I put a new disk in but that did not stop the slipping.

The pins that screw in the flywheel that holds the three large disks are loose and the clutch pedal rattles a great deal. Could the loosened pins cause this trouble? Could I drill new holes in the flywheel and put in new pins? The holes for the old pins are worn.—S. D. S., W. Va.

We believe that the trouble with the Crow Elkhart car, model 33, to which you refer, is probably in the pins that screw into the flywheel. If you will replace these with oversize pins, we believe that you will find that the clutch will work smoothly again.

Care should be used in replacing the pins, as they should be spaced evenly and at right angles to the flywheel as they were when new.

* * *

Starter Works Sluggishly.

We should like to have you answer this question in your next issue:

We had a Dort car come into our place with the starter working sluggishly. We took the cable off and put a larger one on, and it made the starter gain three or four times the speed it had. Was it the large wire reducing the resistance, or was it particles of dirt that fell off in changing the wire?—W. H. W. & Co., Ind.

There are two things that might have caused the Dort starter to increase in speed. If a larger wire is used on the starter cable, there will be less resistance offered to the flow of current in the starter, and less power will be produced in the starter.

On the other hand, the size wire previously used might have been sufficiently large but may have become corroded underneath the insulation. If corrosion takes place at one spot and goes through the cable, it sets up a very high resistance which will materially affect the operation of your starter.

If you know the amount of current that the starter requires, you will be able to determine this by referring to the article "Operation of the Electrical Units," which appeared in the April issue of the *AMERICAN GARAGE & AUTO DEALER*, and to the table of wire sizes and formulas given in that article.

* * *

Adjusting Ford Generator Output.

Will you please tell me if a generator on a 1921 model Ford can be set up to make it charge more and just how to do it?—R. T. W., Fla.

It is rather an easy matter to adjust the output of a Ford generator. The amount of current generated is controlled by the position of the third brush. If the third brush is moved in the direction of rotation, the output will be increased. If moved in

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your business, the more you will know—and the more you know, the more money you will make.

Whether you are a dealer, a salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

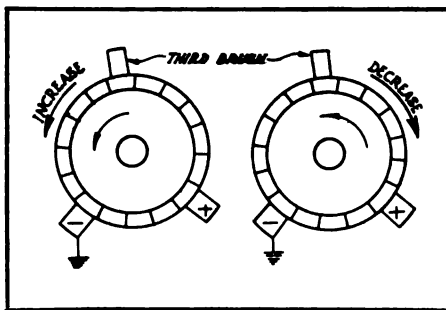
Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

the opposite direction of rotation, the output will be decreased.

Take out the small screw at the end of the generator that holds the dust cap in place, and you will notice a nut above the commutator which holds the third brush in place. This nut can be loosened with a special wrench that can be secured at any



Setting of Ford Generator Brush.

Ford parts house, after which the entire brush holder can be moved either forward or backward.

Be sure and tighten the nut when the job is finished. It is also an excellent idea to sand in the brush after it has been re-seated. However, it is almost an impossi-

bility to do this unless the generator is removed from the car.

The illustration shows the setting of the brush.

* * *

Wisconsin Headlight Law.

Can they compel anyone to use the dimmer lens in a car in the state of Wisconsin?—F. H., Wis.

We are informed that it is not necessary to use a headlight lens in order to comply with the Wisconsin law.

The headlight law in Wisconsin simply defines the kind of light one must have, placing a limit on the amount of light which is permitted above the level of the headlight and a minimum on the amount of light which one must have below the level of the headlights. This maximum amount of glare and minimum amount of driving light does not, however, constitute what you would call an ideal driving light but simply the worst light that the law will tolerate.

However, although homemade makeshifts will get by the law, they certainly will not assist the headlights to give the best possible service. If one wants a driving light that is legal, he can just as well have one that is far better than the light he has been getting from plain glass if he will install a properly designed lens.

Your inquiry leads us to suspect that you may have been using lenses with results which were not pleasing to you. The cause of this may have been due either to the kind of lenses you were using—for many lenses are designed only to stop glare and do not improve the light—or you have possibly had a good pair of lenses and the installation was not properly made. Perhaps one headlight was pointing up in the air and the other off at the side of the road, so that the light didn't strike the road at all.

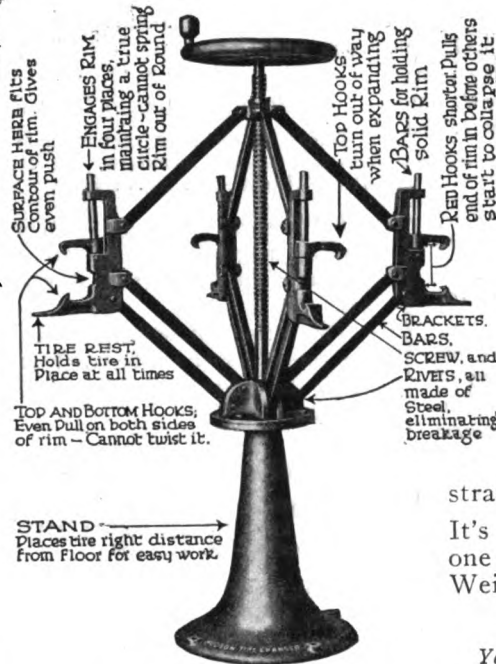
It may be that the bulbs were not focused properly for the particular type of lens which you are using. Different makes of lenses require different methods of focusing the bulbs, and one should not attempt to install any lens without carefully following the instructions given by the manufacturer.

Almost any sort of headlight lens will improve the driving light over what can be secured with plain glass. Some lenses are better than others, of course, just the same as some tires are better than others.

As has been stated, probably no one will compel you to use headlight lenses, but if you don't use a pair of good lenses you are missing a large part of the comfort and pleasure to be obtained from night driving, as well as endangering yourself and others every time you take your car out.

It is easy to think of a headlight law as

The HUDSON TIRE CHANGER



JOBBERS

A fine proposition for you. Write immediately.

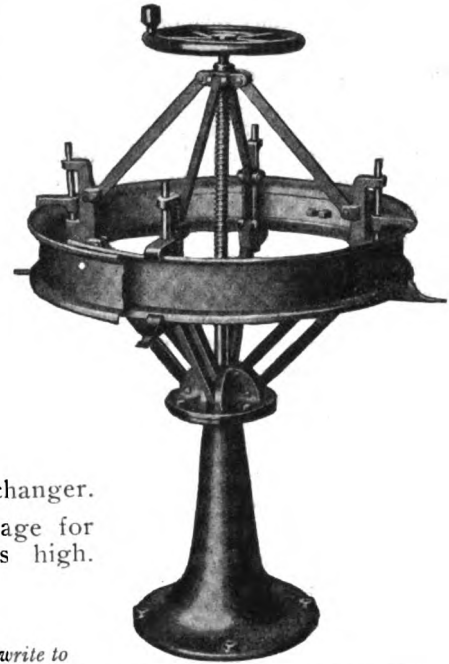
THE REAL EQUIPMENT FOR THE JOB

Whether it's an old rim or a new one—hard or easy—the Hudson will handle it and handle it well. Hudson construction, Hudson power, and Hudson ability to withstand strains make it a "real" tire changer. It's guaranteed against breakage for one year. Stands 40 inches high. Weighs 80 pounds.

Price \$35.00

You will want further particulars, so write to

HUDSON PRODUCTS CO.
155 Grand Ave. Portland, Oregon



TIREMEN

Worth-while offer for one tire shop in each locality.

The Best Tire Changer at any Price

THE FRISZ WHEEL & GEAR PULLER NEVER SLIPS



Made in
FOUR SIZES
to take care
of all size
gears and
wheels

Don't Waste Time and Lose Money

fussing with a wheel puller that grips poorly and slips.

Get the Frisz Wheel and Gear Puller. Its massive gripping fingers hold like a ship's anchor. They never slip and their grip is equally automatic, whether expanding or contracting. The drop forged, high carbon, nickel steel arms are always parallel with the power screw. This means a pull always in a straight pull—an easy pull.

Free from complicated parts. Needs no special attachments. Made of finest materials; heavily reinforced where stresses come heaviest.

Get the Frisz Wheel and Gear Puller from your jobber—today.

JOBBERS—Write for our interesting proposition.

FRISZ MFG. CO.
34th and Illinois Sts. Indianapolis, Ind.

Battery Repair Men! Automotive Electrical Stations!

Suppose a specialist were to enter your shop and help you select instantly the right battery, magneto or ignition part necessary to handle every job;

—and he also showed you the most economical way to buy Battery and Electrical testing and repair equipment: the kind that insures quick and skillful results;

—and his wealth of information included every tool and Replacement part that finds its way into a modern battery or electrical service station like yours;

—would you like to have his services—FREE?

Our new 138 page catalog is just such an expert—a helper that points a finger to the exact solution of every equipment or parts problem.

A copy will be forwarded on request, FREE—WRITE NOW!

W. F. PRICE BATTERY SUPPLY CO., Inc.
3300 N. Broad Street. Philadelphia, Penna.

something that is complied with entirely to the advantage of other people, because the emphasis is usually laid on the anti-glare feature of the law, rather than on the minimum driving light feature.

Even from the standpoint of stopping glare, if there were nothing else to be gained, there would be a big advantage to everyone who uses a pair of good lenses. The driver who goes about with his headlights glaring is certain to blind other people and sometime, sooner or later, he will blind someone so much that there will be an accident.

This accident may not result in the other car running off the road but is more likely to result in a collision, which would hurt the driver whose headlights glare just as much as it would hurt the other fellow.

In case of a collision of this sort, the Wisconsin headlight law provides that the driver whose headlights glare is responsible, and that he would have no chance in court in case of a lawsuit arising from the accident.

* * *

Grind in Ford Motor.

I would like some information. I have a Ford which had the oil drain dented in but not enough to make the magnets stick. I took the motor out of the car and, after putting it back, a grind developed.

When it was in high speed, if I rested my foot on the low-speed lever, it would stop. The sound was a humming grind. There were no marks to show where anything had been rubbing. Everything seemed to be O. K. except for the noise. Could a sprung crankcase cause this noise and, if so, why only on high? It did not make any noise on any other gear.

When we put the engine together, every bolt-hole fitted perfectly. If you could give me some light on this, I would appreciate it very much.—R. L., N. D.

Here is still another subscriber's experience with the difficulty complained of in this query, in connection with which we have published letters from other subscribers in our December, January and June issues. A New York correspondent gives the following:

"In reading the June issue of your magazine, I notice a query as to a grind or humming in a Ford motor, by R. L., N. D.

"I have had the same trouble, caused by shimming the magneto coil too close to the flywheel. With the motor out on the bench, ample clearance seemed evident, but either the slight allowable end-play in the crankshaft or the push of the rear axle when going in high gear caused the slight humming grind.

"When the low-speed pedal is depressed, the thrust of the clutch spring tends to draw the flywheel away from the coil and stops the noise."

* * *

Leak in Cylinder-Head Gasket.

Will you please tell me, through the AMERICAN GARAGE & AUTO DEALER, what causes the cylinder-head gasket to leak or blow out on a Ford car?—E. S. B., Mich.

Assuming that you are using a good or a

new gasket, and that the cylinder bolts were properly tightened, your trouble is probably due to a warped cylinder head. A new head will usually remedy this trouble.

If a large surface plate can be had, the head may be lapped down by using some good lapping or grinding compound. In some instances, the heads have been lapped

Now It's Your Turn.

In answering these queries concerning the difficulties arising in garage work, we have given the generally approved methods.

But we realize that many of our readers will have a different way of "doing the trick," and can offer interesting and helpful suggestions from a different angle. So we would like to have you tell us whenever you have a different method for handling these various questions.

Let's make this a Round Table for the exchange of ideas and thus be mutually helpful!

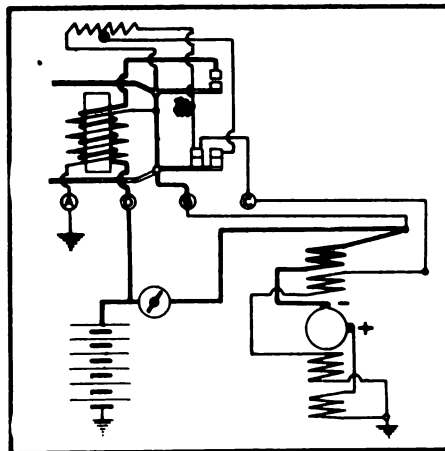
down on the cylinder block with good success. It is important to see that all grinding compound is removed from the engine before it is assembled.

* * *

Charging Circuit for 1916 Monitor.

Please give detailed diagram of the charging circuit of a Monitor, model 1916. This car uses a single unit starter and generator, Disco electric system, 12 volts, model 260, with a Ward & Leonard voltage regulator, type C D 68.

This machine was equipped with an Elyria Dean light and ignition switch, but



Wiring for 1916 Monitor Car.

this is now out of commission and common push and pull switches are used.

The generator is in first-class condition, but we don't seem to get the charge to the battery.

Also, is the Ward & Leonard voltage regulator a cut-out as well?—S. P. H., Ohio.

The diagram which we are publishing on this page shows the exact wiring for the 1916 Monitor car using the Disco 12-volt

system with a Ward & Leonard regulator.

The regulator is used as a cut-out as well. The cut-out closes at 1,250 r.p.m. and has a 10-ampere maximum output of 2,100 r.p.m. and above.

* * *

Meaning of Term "Camber."

I shall appreciate it very much if you will tell me what is meant by "the camber" of front wheels.—R. S. N., Wis.

By "camber," we mean that the wheels are not perpendicular, but are closer together at the bottom than they are at the top.

This method of setting the wheels brings the bottom center of the tread more nearly under the center of the axle and thus aids steering.

* * *

Testing Storage Battery Jars.

Can you tell me of a simple method for testing used storage battery jars for very small leaks?—E. L., Minn.

A high voltage test will serve well for testing battery jars when small leaks are suspected. The jar should be inverted over some metal object, such as a tin can that is smaller than the jar but similarly shaped, and subjected to a high voltage test by connecting one of the leads to the inner support and passing the other lead over the surface of the jar.

The current will find its way through the smallest openings if the inner support is within a quarter of an inch of the test lead.

Any vibrating coil will serve well for such a test. This method is positive and should be used on all rebuilding jobs, as it requires but little time and insures a leak-proof job.

* * *

Knock Caused by End Play.

I must again call upon you to help me out in overhauling an Oakland 34-C 1920 model. I have taken up the bearings—that is, the main bearings—and there is still a dull knock. It is not very loud but it is there all the same.

I have taken down the oil pan and find that all bearings are tight but find that there is about 1/64-inch play in some of the wrist pins. Do you think this would be the fault? If so, what must be done, as it looks to me like there is no bushing in the piston. The pistons are aluminum. Must the piston be renewed or should I get new wrist pins?—G. W. W., Pa.

A New York subscriber sends us the following suggestions in connection with this question which was also published in our June issue:

"My belief is that the knock in the Oakland car, which G. W. W., of Pennsylvania, inquired about, comes either from a main bearing that needs about one more shim taken out, or the shaft is out of true or sprung so that one of the main bearings binds but is not tight.

"This may be a poor guess, but I have found that these things cause similar troubles with me in my motor work."



NEPTUNE

The Pure Distilled Water For STORAGE BATTERIES

Why Dealers Can Realize Attractive Profit by Stocking Neptune Distilled Water:—Did you know that all battery guarantee is subject to the use of distilled water? Motorists have need of distilled water at least twice a month; so have you, Mr. Garageman, for the cars in your garage. Make it an added bit of service.

Neptune Distilled Water is pure—free from mineral or organic matter in suspension or solution. It means Long Life to Batteries. Neptune Distilled Water can be purchased in 5 gallon Carboys and 50 gallon barrels for your own use. Send in your order today.

Small Investment — BUT — Substantial Profit. Who is a more logical dealer in distilled water for storage batteries than the garage owner and accessory dealers? When a motorist buys his lubricants and accessories, sell him his battery maintenance requirements as well. Cost to dealer \$2.50 for case of 12 half-gallon bottles; retails at \$3.60. The bottle and case have a value of \$1.70 (50 cents for case and 10 cents a bottle) anywhere in the U. S.; we will refund this amount if returned to us. All prices F. O. B. Chicago. Send money or check with order.

Hinckley & Schmitt, Inc.

420 W. Ontario St.

CHICAGO, ILL.

AUTOQUIP PUMPS



No. 31. Peerless Steel Barrel Air-chuck, anchored into base by Patented Process. Quick acting air chuck, heavy tubing, reinforced base with special ground grip flanges.

PROFIT Plus ECONOMY

There is profit for the dealer in selling one line of pumps—if within that scope he has A SIZE — A STYLE — A PRICE — to satisfy every customer. There is also economy, for his turnover is naturally big.

AUTOQUIP Pumps are so recognized.

Write today for prices and discounts. Giving name of your Jobber.



No. 21 Paramount. High grade single acting pump. LOX-on Jr. Air Chuck. Brass Tube and Brass Check Valve. Heavy Reinforced Base, length 21" over all. A LIFE LONG PUMP.

Autoquip Mfg Co. Inc.

ROCHESTER, N. Y.
MANUFACTURERS OF

LOCKTYPE ANTI-RATTLERS



TURNER

2 in 1

TIMER

Has stood repeated and rigid tests for over five years and has proven a genuine quality article and a boon to every Ford owner. Increases power, insures an instant start in all weather, lessens fouling of two front plugs, saves gasoline and stops motor "kicking." Is oil, grease and water proof. Requires no oiling and is easily installed.

TURNER FOOT ACCELERATOR

For Fords. Gives positive and quick throttling and allows use of both hands in driving. Installed in 10 minutes by anyone. Simple and durable. Price, \$1.

SPRING SPREADER AND LUBRICATOR

Greatly increases riding qualities of any car, stops squeaks and spring breakage and increases spring wear. Makes steering easier and saves tires. The only device made that spreads spring leaves and lubricates them in one operation without fuss or muss. For all cars. Price \$2.50.

For convenience of car owner we furnish 1-lb. cans of special spring lubricant for use with our Lubricator.

Turner Manufacturing Co.

KOKOMO, INDIANA

Welding, Cutting and Brazing Practice

(Concluded from page 29.)

gether without piling the metal symmetrically along in a ridge on the joint. It is utilized on practically all metals—even on thin sheet-metal jobs. The filler is fed slowly into the bath as it moves along the seam in a series of adjoining pools of molten metal. It is cruder in appearance but is no doubt stronger, unless the welder is able to reach the under side of the ripple and make sure this is properly finished.

While it is rather difficult to keep impurities from entering the weld, it is comparatively easy to remove them as the weld is made. Each bit of impurity will turn to a dazzling white bead when the flame is applied directly to it. Then the welder may remove it by dabbling upon it with the filler rod, or he may sometimes re-

move the bit of slag with the pressure of the welding flame.

If not removed, the impurity will cause a tiny hole or crater in the surface of the weld, such as is shown in one of the illustrations. While this photograph is magnified considerably, this slag hole—or pin hole, as it is commonly called—indicates the weakness it lends the weld. Had the offending bit been removed before the weld metal closed over it there would be no pin hole.

We have scarcely scratched the surface of the subject of the welding flame. Lack of space forbids further discussion here, but the beginner should be able to gather from this the fundamentals of the process. Then, with actual practice, he will gradually develop the theory given—for prac-

tice he must have, else what he learns from the book will do him little good.

TREAD PATCH, BIAS CUT AND INSIDE BOOTS

(Concluded from page 23.)

are cut to the same dimensions as in the boot made of old material, placed in the tire and vulcanized. A longer time must, of course, be allowed for cure.

Knowing the sizes of tires most common to the shop and that almost every tire necessitates an inside reinforcement, the repairman will do well to utilize his spare time in making up a good stock of the ordinary sizes of inner boots. Keeping such a stock on hand, the shop is able to render quick and efficient tire service at all times.

Accessories—Dealers' Key to Profits

"Bringing Home the Bacon" with a Service Electric Sign.

Are you interested, Mr. Dealer, in putting that sales message of yours across in a way that will make a lasting impression upon the minds of your customers and prospective customers? That will put it up to them in so forcible and effective a manner that they will be reminded constantly of your goods and will tell their friends about them?

If you are, then you will be especially interested in Service signs, for they are real sales messengers and always ready to serve you faithfully and efficiently both day and night.

As an eye-catcher and attention-getter, action in your display is, of course, of prime importance. The Service electric sign, with its continual flash-on and flash-off, gives this much-to-be-desired element. In your windows, in your store, on your bargain tables, in your display cases, the Service flash-out sign draws the attention of prospects to the merchandise to be sold. It is a genuine business producer, day and night, winter and summer, year in and year out.

Service signs are changeable—an extremely advantageous feature. No matter what the message you wish to use, all that is necessary is to rearrange the letters in the sign and any sales message desired can be displayed.

An electric service sign comes to you complete—there are no extras, no accessories nor attachments required. With each and every service sign a complete assortment of interchangeable celluloid letters, characters and numerals in various sizes

and in color—350 in all—is included. These are arranged in alphabetical compartments in a neat case.

Thus, an attractive appearance can be given by the use of artistically colored letters in making a multi-colored sign display. Everything necessary for a life-long use of the service sign is included with it.

Undoubtedly, attractive display cards are real business pullers—but the regular



Service Signs Make a Lasting Impression on Minds of Customers and Prospective Customers.

use of showcards involves a considerable expenditure of time and money. A Service electric sign gives a thousand showcards in one. It does not matter what you wish to say or how you wish to say it,

what price you wish to feature or how you wish to feature it, the changeable feature of a Service sign enables you to meet all these requirements. Then, too, with a Service sign, your sales message gets more attention because it is lighted and the light winks on and off.

The size of the Service sign is 20 ins. by 13 ins. by 7 ins. It is strong, sturdy and attractive, and the economy of its use will be apparent to all.

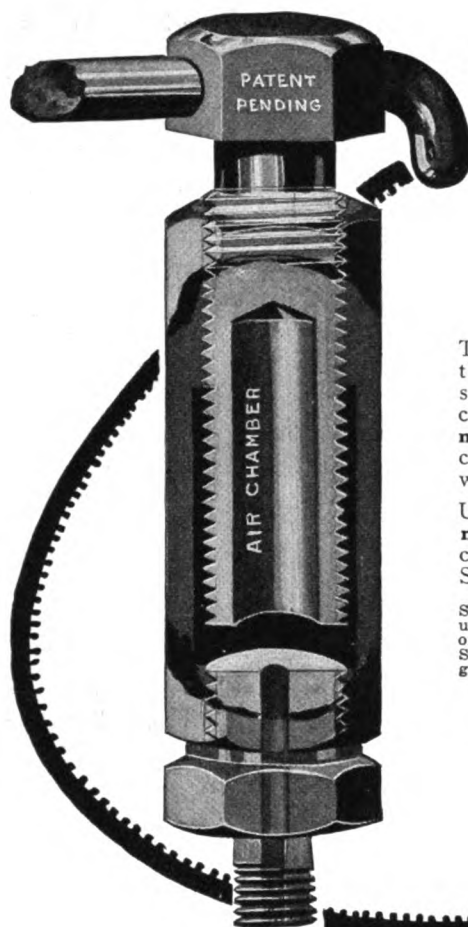
Ask the Service Sign Co., 414-415-416 City National Bank Bldg., Dayton, Ohio, to send you descriptive literature and prices.

Reorganization of A. R. Mosler & Co. is Announced.

The firm of A. R. Mosler & Co., New York City, which has been in receivers' hands for a period of about 20 months, was taken over by a new organization headed by a number of prominent Eastern financiers, on May 25, 1922. Hereafter, the business will be operated under the title of the "Mosler Metal Products Corp." For the present, communications should be directed to this company at P. O. Box 292, Mt. Vernon, N. Y.

To a complete line of spark-plugs, which the company has always made, there will be added a number of automobile accessory lines and a full line of radio material.

An early announcement will be made, covering the full details of this reorganization, and every assurance is extended to the trade whose business A. R. Mosler & Co. have enjoyed for the past 22 years, that the highest standard policy and merchandising will be maintained.



It's a Winner

THE STRICKLER HIGH PRESSURE GREASE AND OIL GUN

**MAKES GOOD
BECAUSE IT'S MADE RIGHT**

The Strickler wins where others fail for the reason that it can't burst through back pressure. Look at the illustration of the Strickler and see why. This High Pressure grease and oil gun is made of solid, cold rolled steel, machined out and threaded from the bar stock. It's **not** cast. The pitch of threads gives positive, steady feed, and air chamber acts as cushion to steadily compress the grease and force it, without strain, where it belongs.

Under pressure of the Strickler, dust, dirt, corrosion and hard grease **must** go. Used everywhere as an auxiliary to lubricating systems costing great deal more. Price of gun \$3.50. Extra nozzles 80 cents. Specify name, date and model of car.

Series of special male and female nozzles make it possible to use Strickler High Pressure guns on any car. Manufacturers of Franklin, Pierce Arrow, and many others use and recommend Strickler High Pressure grease and oil guns. Special sets for garages, for use wherever grease cups are used, \$18.00 with gun.

Get complete particulars at once.

ADKINS, YOUNG & ALLEN CO.
561 Washington Blvd.
Chicago, Ill.



Unique Construction that Positively Prevents Fouling

The **ASKO** SPARK PLUG is so designed that it burns off the oil from the vital parts as soon as it is deposited. Without this oil to bake in with the soot no carbon can form. The dry soot is easily disposed of—Simply blown out of the plug chamber with every exhaust. This method is infinitely superior to ineffectual efforts to **prevent** the deposit of soot and oil.

That the **ASKO** does not foul has been proved on thousands of cars of all makes under the most rigorous service conditions.

The **ASKO** is strictly a heavy duty plug—body all brass, heavy stone 775 insulator and oil splash plate.

Thousands in use—sells on its merits.
DEALERS—Write today for data.

Allen Specialty Co.
2751 West Lake St. CHICAGO

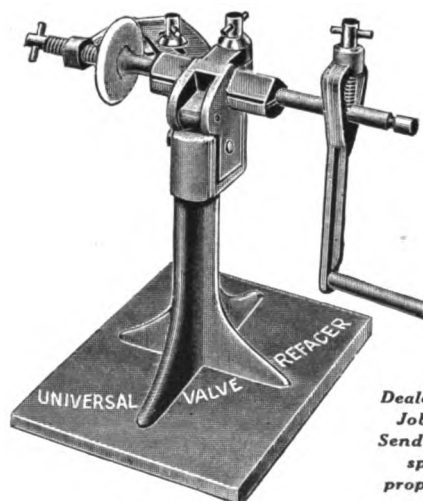


Manufacturers also of OWL Plugs especially designed for Fords and Fordsons

A Few Turns and the Job is Well Done

Valves usually thrown away can be quickly and easily put in A1 condition with the Universal Valve Re-facer. It refaces edges, thins and otherwise reshapes burned and distorted valve heads, saving much time usually spent in grinding. Valves with worn, grooved, or slightly warped stems properly handled. The most rapid valve re-facer made. Specially priced at \$7.00. If your jobber cannot supply you—order direct.

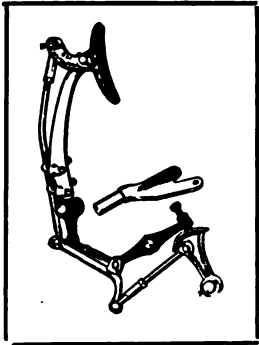
UNIVERSAL EQUIPMENT & SUPPLY CO.
Desk D-7
Syracuse N. Y.



*Dealers and
Jobbers:
Send for our
special
proposition*

Taking the Guesswork Out of Ford Car Operation.

For Ford owners who want to eliminate guesswork and uncertainty in the operation of their cars, the B & C neutral pedal offers a number of attractive features, its purpose being to provide a positive neutral position in operation.



B & C Neutral Pedal.

First, the emergency brake is made independent of the operation, the cam which has controlled the clutch release through the emergency lever being taken

away. This leaves the lever with only the rear end to provide for, so that it may be set up as tight as desired without affecting other adjustments.

The emergency lever may then be left in the old position on the floor of the car or, if used regularly to lock car when stopping, it may be arranged to stand in a convenient position within easy reach of the hand.

In substituting the new pedal for the regular one that comes on the car, a hinged foot plate is provided in place of the fixed one. Thus, the connections back of the pedal may operate to control the position of the cam to maintain the clutch release or what we call neutral position.

The operation of the car is not materially changed and, when leaving the car, the clutch is released and the pedal left in neutral position.

When starting, the pedal is pressed forward at any angle to engage low and, when rolling, release into high can be had simply by raising the heel a trifle. In order to reach neutral, it is necessary only to press on the lower edge of the pedal from high or low.

Delivery car drivers appreciate the quicker action obtained through the use of a B & C neutral pedal, as well as the greater security of the brakes and the more convenient location of the brake lever.

For traffic, the complete release of the clutch makes the foot brake effective without opposition by the gears, and both hands may be used on the steering wheel.

The permanent control of the neutral position, without the aid of the emergency brake and without holding by the foot, leaves both feet free to use on the reverse and brake pedals for more certain control without wear on the transmission.

More comfort and less wear on hands is given when coasting over rough places or down grades, through the instant changes with the relief from constant foot pressure.

Beginners, particularly, find the B & C neutral pedal helpful, for it makes it possible for them to drive in comfort and safety in a much shorter time, it is stated.

The manufacturers, the Burnham-Cote Co., Holyoke, Mass., will promptly forward full particulars to all interested, concerning this new Ford accessory, with which they are giving a comprehensive guarantee.

Flexlume Interior Signs Mean More Attractive Showrooms.

Nothing adds more to the appearance of the interior of a showroom than small electric signs marking the different offices opening off the main floor, such as "President," "Sales Manager," and so on.

The reason that more showrooms are not electrically equipped in the matter of signs has been the difficulty in procuring signs that are small enough to fit into the niches above the various doors and at the same time be legible at any considerable distance.

For the past two years the engineers of the Flexlume Corp., Buffalo, N. Y., have been working on this problem, and they have finally solved it by a system of two-way lighting. The result is what is known as the Flexlume interior sign, in which the letters are only of 2-inch size, but the illumination is so scientifically arranged that each one of these tiny letters can be read clearly and distinctly at a considerable distance.

The principle on which these signs are illuminated is best explained by the illustration on this page. It will be seen that the lighting from the lamp at the bottom of the sign is thrown two ways. It is thrown behind the letter-plate, which illuminates the raised white letter from the back. It is also illuminated by the light being thrown on the outside face of the letter. This causes the letters to stand out clearly and distinctly, and the illumination is absolutely uniform.

This new sign is meeting with great suc-

cess among banks, where it is used as an illuminated sign over the various windows and also for marking the location of departments. Hotels are also using it very extensively. There is nowhere that it has a better application than as an interior sign for automobile salesrooms.

The Flexlume Corp., 25 Kail St., Buffalo, N. Y., will promptly forward further details to all interested upon request.

You Give Customers Real Service When You Sell the Auxilo.

A frequent source of trouble and annoyance to Ford car owners lies in the tendency of oil to follow the crankshaft and work out of the crankcase onto the pulley which drives the fan, and so to the belt. This saturates the belt and causes it to slip, as well as baking into it and causing it to crack and break.

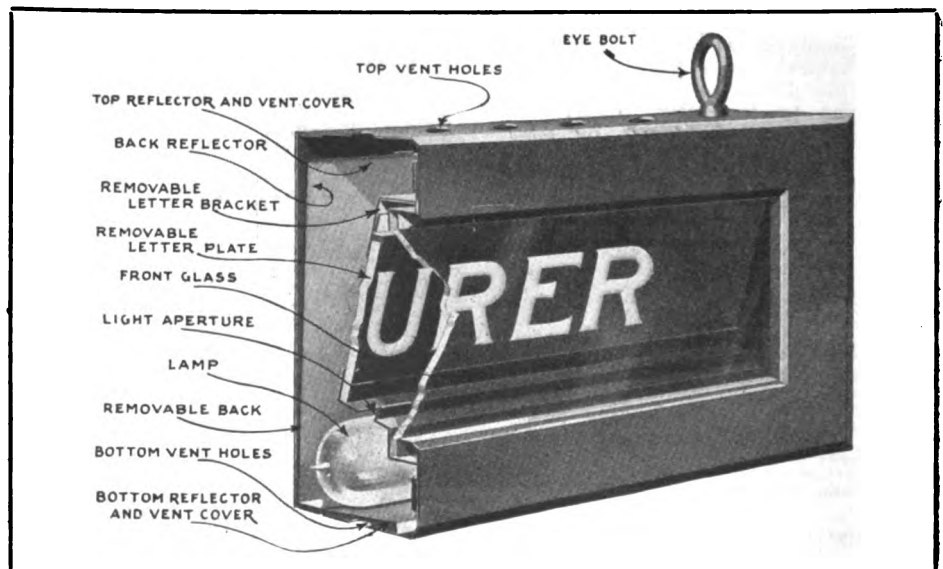
The car owner finds that the fan does not run at the speed intended and necessary for the proper cooling of the motor. He may find that the radiator heats from some cause unknown to him, and that the water boils when climbing hills in low gear.

Frequent replacement of fan belts is costly. So, also, is the loss of power and the need to use more fuel to drive a heating motor, the excessive burning of oil and the wear on all motor parts.

What could be more pleasing to your customers, then, than to be told of a simple and inexpensive device which, when installed in their cars, will insure against this trouble?

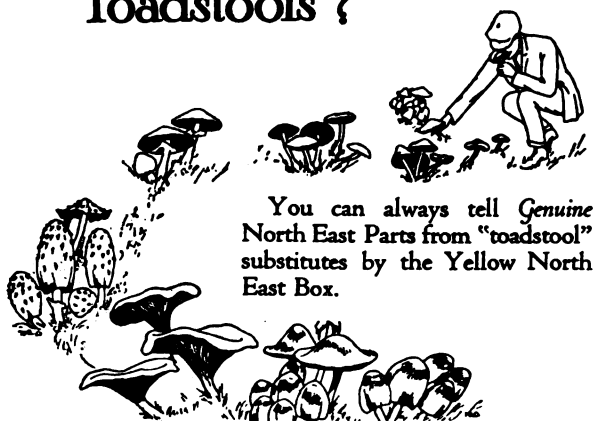
Just such a device, it is said, is to be had in the Auxilo, which is shown in the illustration on the next page. It is made of steel, two parts being hinged and provided with a catch for positive locking in position on the crankshaft just where it emerges from the crankcase.

It carries a felt gasket, which is so held



Lighting From the Lamp at Bottom of Flexlume Sign Thrown Two Ways.

Mushrooms or Toadstools?

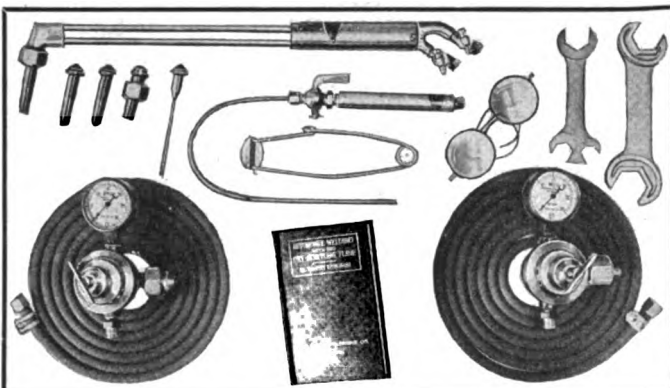


You can always tell Genuine North East Parts from "toadstool" substitutes by the Yellow North East Box.

Genuine North East Service Parts are distributed to the trade by

NORTH EAST SERVICE INC.
ROCHESTER, N. Y., U. S. A.

Atlanta, Ga. Rochester, N. Y.
Chicago, Ill. San Francisco, Cal.
Detroit, Mich. Windsor, Ont.
Kansas City, Mo. London, Eng.
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REGO "LITTLE SIX" AT \$57.50

In response to insistent demands from garagemen and repairmen everywhere for a small, compact complete combination welding and cutting outfit of quality—we are offering the REGO "LITTLE SIX" at \$57.50.

Here is an opportunity to secure an outfit with which to make good profits on welding, cutting, brazing, lead burning, radiator repair and decarbonizing—at an extremely attractive price. It's a big opportunity. Don't fail to take advantage of it without delay.



Write for our snappy little booklets "Sparks" and "Facts"

THE BASTIAN-BLESSING CO.
135 West Austin Ave. Chicago, Ill.

LEATHER

Automotive Products

INCREASE your profits—make more sales and better satisfied customers. Genuine leather products have come back into their own. They are better than substitute materials and **now are as low priced.** That's why every dealer should be interested in our complete line—

Wetprufe Flat Fan Belting
Vee-Flex, Vee-Sol and V-Lug Roll Fan Belting
Tough-Tan Leather V-Belts
Leathertex and Wetprufe Cone Clutch Facings
Universal Joint Discs
Anti-Squeak Lacing



Our Group Fan Belts are especially popular this year. They enable dealers to fill all ordinary requirements from a very compact stock. The "Popular" Group (shown above) accommodates 212—and the "Favorite" Group accommodates 288—leading makes and models of cars, trucks and tractors. Also, keep in mind this well-known standard product—



Flat Fan Belting in Rolls

Sold by leading dealers everywhere. Ask your jobber for full information or write today for our complete catalog and discounts.

HIDE, LEATHER & BELTING CO.

Established 1870

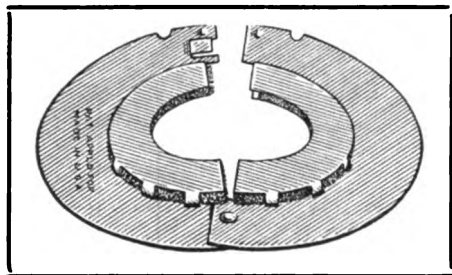
DETROIT
EVANSVILLE

INDIANAPOLIS

MEMPHIS
NEW YORK

that its edges are free and open, and this felt gasket is attached to the side next to the crankcase, so that any oil working along the shaft is absorbed and thrown off before it can reach the belt.

"We are selling the Auxilo to our cus-



Auxilo Prevents Excessive Oil Burning.

tomers, knowing that we are doing them real service by so doing," said one dealer of this helpful economical device for the Ford.

Its application is simple and quick, as there is nothing to take off and the Auxilo goes right into place.

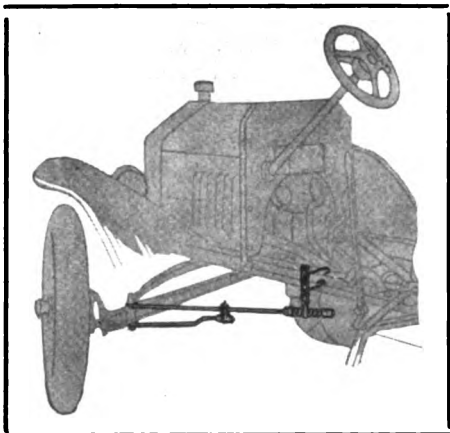
Descriptive literature, prices, etc., can be had upon request from the Burnham-Cote Co., Holyoke, Mass.

Adjustable Unit Replaces Regular Rods on Ford Cars.

"Common Sense" radius rods—a patented adjustable unit for replacing regular rods on Ford cars and trucks—have been placed on the market by the Silver Mfg. Co., of Salem, Ohio.

The new rods, which the makers say will add strength, safety and driving comfort to the Ford car, are fastened securely to the frame on each side of the car and anchored firmly to the front axle above and below. The strong construction of this device takes all strain off the crankcase.

Through the adjustment feature, perfect alignment of front wheels is always



"Common Sense" Radius Rods Are Adjustable.

assured, it is stated. The proper rigidity to withstand severe thrusts and give flexibility and resilience is attained by strong springs held in place by adjustable nuts.

"Common Sense" rods prevent back-

crawling of axles, which makes so many cars steer hard. They enable the Ford to hold the road like a big car and to turn sharply without fear that the steering gear will jack-knife or the wheels buckle.

Further details concerning this new Ford accessory will be supplied to all interested upon request by the Silver Mfg. Co., Salem, Ohio.

Plans to Develop World Market for Gruss Air Springs.

The Cleveland Pneumatic Tool Co., of Cleveland, Ohio, one of the largest manufacturers of its line in the world, with distribution branches in all large cities in this country and abroad, recently secured manufacturing and sales rights for Gruss air springs, a device which utilizes cushions of compressed air to absorb road shocks and vibrations. They have been manufactured for several years on the Pacific Coast by the Pneumatic Cushion Co., of San Francisco, patentees. They are now extensively used on passenger cars, trucks, and motor busses throughout the west, it is stated.

The Cleveland Pneumatic Tool Co. became interested in this device as a result of the remarkable success of Gruss air springs on the Pacific Coast. They have been adopted by a majority of the large truck fleet operators west of the Rockies, it is said. For instance, the Union Oil Co., of California, operates about 300 Gruss-equipped trucks. Many other companies of like caliber use them on their heavy trucks, service trucks and passenger cars. The California Transit Co. uses them on their 68 motor busses and a long list of other motor bus lines have adopted them as standard equipment. They are also extensively used on passenger cars throughout California.

Negotiations were opened with the Pneumatic Cushion Co. some time ago, but were not closed until the engineers of the Cleveland Pneumatic Tool Co. had made extensive and exhaustive tests on Gruss air springs under every conceivable condition. The results of the tests were so gratifying that they now feel justified in going ahead with extensive plans for world-wide distribution.

You Can Please Every Motorist with a Hough Townplate.

Every motorist is anxious to boost his own town—therefore, Hough townplates are ready sellers, as well as being an attractive addition to any car whether it is new or old.

The Hough townplate is made of No. 26-gage steel, size 2 ins. by 10 ins., double-baked enamel, will not chip off nor discolor from road or weather, it is stated, and is easily cleaned whenever the car is washed.

It is attractive in appearance, being hard enameled in two colors to match your

state license plates. The large raised letters for your town's name are easily seen against a background of contrasting color for a long distance.

The Hough townplate has been endorsed



Hough Townplate Boosts Home Town.

by every Business Men's Association and Chamber of Commerce, it is stated.

A very attractive display easel, which furnishes a practical method for displaying Hough townplates and fasteners as well as drawing the attention of customers to them, can be supplied and is an aid in making good sales for the dealer.

Write Frank G. Hough & Co., Room 300, 650 N. Michigan Ave., Chicago, for further details.

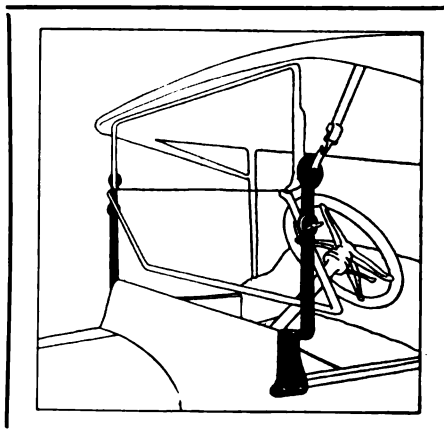
Every Ford Owner a "Live Prospect" for Breeze Brackets.

In the old days it meant considerable discomfort to drive the Ford on a hot summer day. How we longed for a cool breeze, a relief from the heated floor of the car!

Buckstaff breeze brackets have been designed to furnish this cooling breeze that adds so much to the comfort of the car.

With Buckstaff breeze brackets attached, the lower windshield can be opened, in or out, and a cool breeze directed down into the hottest part of the Ford.

Breeze brackets are easily installed. There are no holes to be drilled. It is only necessary to take off the old bracket and



Breeze Brackets Are Easily Installed.

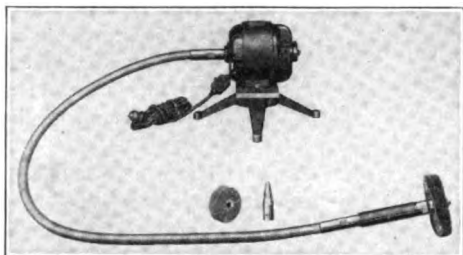
put the new one in its place, using the old glass.

Descriptive literature will be forwarded upon request by the Buckstaff Breeze Bracket Co., 702 "O" St., Lincoln, Neb.

If you do Vulcanizing

YOU NEED THE

Ace of Buffing Equipments



On your request we will give you complete information on Haskins Flexible Shaft Equipment for the Vulcanizing Shop and Garage. Haskins Type RB-S shown above is standard equipment in the modern vulcanizing shop.

The Haskins Utilitool does the work of a small machine shop in the garage—grinds, drills, removes carbon from cylinders, etc.

Prompt response to this advertisement will enable us to also forward a free copy of our booklet on tire repair. As the supply is limited, write today.

R. G. HASKINS CO.

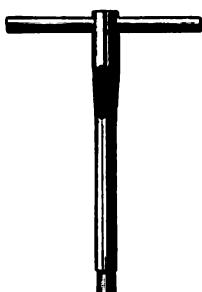
25 S. Desplaines St.

CHICAGO, ILL.

THE HOLLY BUSHING EXTRACTOR

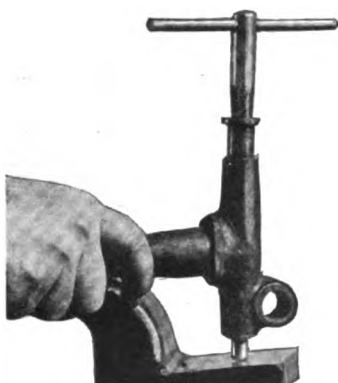
Goes In and Gets 'em

no matter how tight or in how difficult a place a bushing may be. Extracts sizes ranging from $\frac{3}{8}$ " to $\frac{25}{16}$ " inclusive. Used and recommended by Ford Motor Co., Dodge Bros., and Chevrolet Motor Co.



Style of tools Nos. 0, 1, 2, 3 and 4

Tools may be had singly or in sets.



No. 1 Holly Extracting Ford Spindle Body Bushing

Standard set (Nos. 0, 1, 2, 3, 4 and 34B tools)\$18.40

Combination set (No. 579 tool extracts bushings from $\frac{11}{16}$ to $\frac{25}{16}$ " inclusive)\$10.00

Special Ford Set (Nos. 1, 2, 3, 4 and 79 tools, extracts all bushings in Ford cars and trucks)\$20.00

The Rosier-Howard Corporation

307 National
Hutchinson Kansas

Contact Every Time at the Right Time!

Positive contact at high or low speed—
Not affected by engine vibration—
No contact points to clean—
No rollers—
No fibre raceway—
No attention needed after installation—
Those are the special features of the

LEICH MAGNETIC TIMER

(For Fords and Fordsons)

Magnetic pull makes this Timer the most reliable and satisfactory.

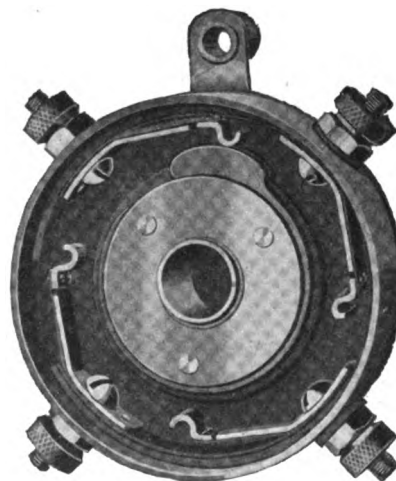
Dealers: Fill in the coupon below and get our special "30-day" trial offer.

LEICH ELECTRIC CO.

Manufacturers of RADD Spark Plugs

GENOA

ILLINOIS



LEICH ELECTRIC CO.
Genoa, Ill.

Please send data and prices on the Leich Magnetic Timer.

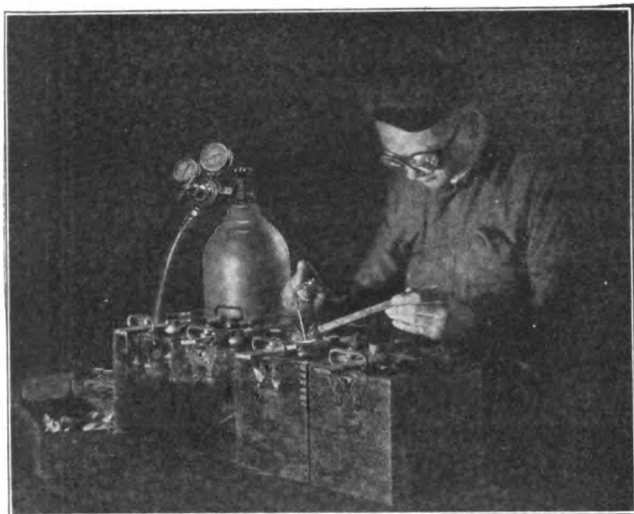
Name.....

Address.....

Up-to-the-Minute Garage Equipment

There's a Rego Outfit for All Types of Welding.

When we realize that there are now 11,000,000 automobiles in use in this country and remember that each of these cars is likely at some time or other to require



Battery Repair Work Easy With Rego Outfit.

battery service, the possibilities in this type of repairwork are obvious.

Every garage and welding shop should be equipped to properly handle this profitable phase of automotive repairwork. Fortunately, it is now possible to obtain a complete outfit for handling this work at a very reasonable figure.

Such an outfit is to be had in the Rego "Little Six" outfit, now being sold by the Bastian-Blessing Co., 135 West Austin Ave., Chicago, which has been designed to meet the present demand for a small but complete high quality outfit for the garage and repairshop trade. This outfit is a special assortment of standard Rego equipment. It was given the name of "Little Six" because of the fact that six most important types of repairwork can be performed with it; i. e., welding, cutting, brazing, lead burning or welding, radiator repair and decarbonizing.

The Rego "Little Six" outfit includes all apparatus required for decarbonizing. It consists of a real decarbonizing torch, regulator and hose. With it is included an instruction book which describes the process in detail.

There are many uses for a Rego lead welding outfit in addition to battery repair. It can be used for welding and brazing thin sheet metal, such as lead, steel, aluminum, gold and copper and the fusing of wire; for radiator work, sheet lead welds, plumbing, tinsmithing, sheet metal manufacturing, radio manufacturing, etc.

The Rego line of welding and cutting equipment is very complete, and there is a Rego torch or a complete outfit for lead welding and battery work for use with any of the gases supplied for the process. Outfits for welding and cutting heavy sections, medium repairwork, for sheet metal, for lead welding and for decarbonizing of cylinders are all included.

If you will write the Bastian-Blessing Co., 135 West Austin Ave., Chicago, giving a description of your shop and the kind of business to which you cater, a description of the outfit most suited to your requirements will be sent to you, together with suggestions as to how you can add to your profits by installing equipment that will aid you in getting your share of the profits to be found in battery repair-work

Tire Man's Hardest Job Made Easy by Hudson Service.

A construction which permits the engaging of the rim in four places and maintains a true circle, top hooks which turn out of the way when expanding, bars for holding solid rim, a tire rest which holds the tire in place at all times—these are just a few of the features which characterize the Hudson tire changer, a tool which will be found of value in any tire shop or garage whether it be a small or large one.

This machine is designed to handle any split rim, hard or easy. The work is done without hammering tire or rim or injuring them in any way, and the stand with which the tire changer is equipped places the tire just the right distance from the floor for easy, rapid work.

The Hudson tire changer is made of the best materials to be found for the purpose, and has no delicate parts to break or complicated parts to get out of order. It is said to be strong enough and have power enough to collapse or expand the stiffest split rim made, and will handle all makes and sizes.

The illustration indicates details of construction which combine to

make the Hudson tire changer an excellent article of equipment for the tire shop or garage.

Hudson tire changers are backed by an absolute guarantee against breakage for one year, in addition to being sold at a price placing it within the reach of the smallest shop.

Full particulars can be obtained from the Hudson Products Co., 155 Grand Ave., Portland, Ore.

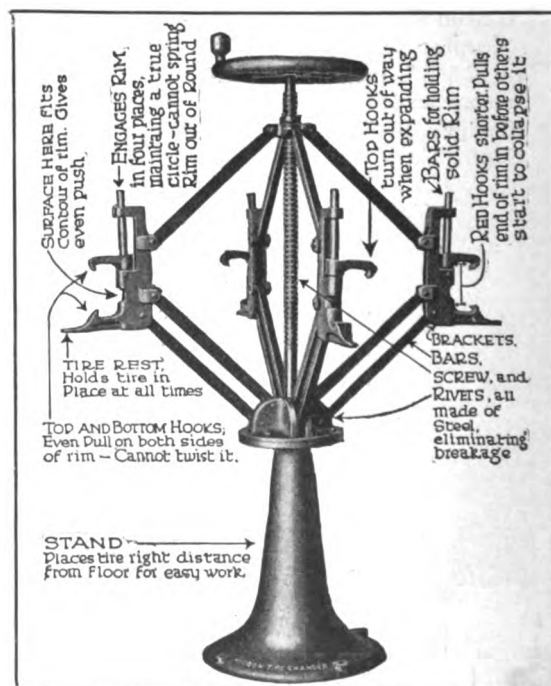
New Belted Motor Grinders for the Up-to-Date Shop.

A good grinder is an essential tool in the well-equipped garage and repairshop. Garagemen and repairmen will, therefore, be especially interested in reading of the new line of belted motor grinding and polishing machines which is being placed on the market by the Saint Louis Machine Tool Co.

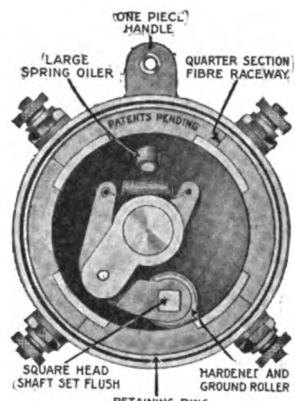
Realizing that about 75 per cent of all current used is 60-cycle alternating and that this proportion is steadily increasing, the designer recognized that the alternating current was the problem which he must consider.

The new belted motor grinding and polishing machines are the result of an insistent demand for such a machine for several years past.

Belted motor grinders are put up to run at about 5,000 surface feet per minute, and the polishing machines at 7,000 to 7,500 feet. Any reasonable speed desired can be



Hudson Tire Changer Handles Any Split Rim.



M&R TIMER

are OH KAY sellers because they are guaranteed. Note the substantial construction and it will be easy to understand why we have the largest individual factory specializing on timer manufacture.

On a solid ring fibre you get two of the wearing surfaces with the grain and two against the grain; this is one of the principal causes of a "humpy timer."

**M & R—In every sense
A Better Timer to Time 'er Better
for all types of Fords and Tractors.
McGULLOCH MFG. CO.
210 High St., BOSTON, MASS.**

If for any reason an M & R Timer is not satisfactory, we will replace it without charge.

The Raceway is of patented construction, made in four sections and cut against the grain. Expansion and contraction without warping is a feature.

The Oiler is spring-top type, self-closing and of sensible size.

The Retaining Ring binds the four-piece raceway and keeps it absolutely rigid so that the posts cannot touch shell and short-circuit.

The Handle is made in one piece and securely attached to shell.

Universally Supreme!

To the Trade:

We have broken all records known to the Automotive Industry. Every Set of Kendell Piston Rings installed has proven 100% satisfactory, having stopt oil pumping and held perfect compression on every motor equipped!

Does this statement not arouse the instinctive pride of your service department to also hold so fine a record?

KENDELL

MOST PERFECTED PISTON RINGS

used on replacement exclusively will not only create, but also hold, this record for you. Let us co-operate with you, write or wire us today.

KENDELL ENGINEERING CORPORATION
Fort Wayne, Indiana



SOLDER TUBE **FLUX IN POCKETS**

SOLDERING FLUX

The
**KESTER core
contains
superior flux**



We're just passing the "good word" around—so you can make those soldering jobs as PERFECT as you want them to be!

Use the coupon below and you'll be glad!

Chicago Solder Co.
4210 Wrightwood Ave.
Chicago, Ill.

FREE SAMPLE COUPON

CHICAGO SOLDER CO.
4210 Wrightwood Ave., Chicago,

Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder

Name

Company

Address

City

Our Supply House is

State

Am. Garage 7-22

furnished. If the user wishes to change the speed it is very easily done.

If the user should, for any reason, change the arrangement of his shop, he can dispose of the bracket and have a standard grinder and a standard motor.

The motor used is the Advance regular type motor. If it ever needs repairing it is easily repaired, all its parts being standard and in stock. This is a fully enclosed, dust-proof motor of the repulsion start, induction run type, single-phase or three-phase squirrel cage.

A compound wound, direct-current motor can be furnished when direct is the only current available.

The motor with this type of drive being overhead and out of the way, the dirt and products of grinding do not get into these machines.

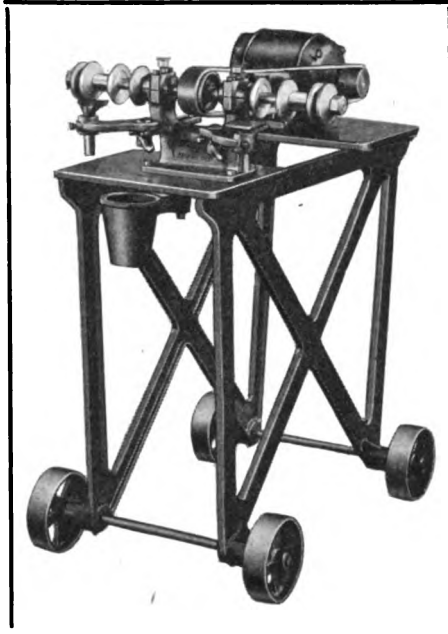
One type of the portable belted grinders is shown in one of the illustrations. This is a solid and substantial, all metal frame, mounted on seven-inch wheels which are large enough to roll easily and yet small enough to make the machine quite stationary when in use.

The wheel guard used on these machines is particularly to be noted. It consists of a steel channel rolled to a segment of a circle. This is very stiff and unbreakable and is further reinforced by a heavy cast-iron bracket which is riveted to the inside flange of the channel.

The bracket is attached to the back rest on the machine by a bolt which slides in the slot and allows the guard to be adjusted backward as the wheel wears. The lips of the guard can be kept close to the

wheel where they are not in the operator's way, thus eliminating danger of dropping material between the wheel and the guard.

This guard effectively prevents frag-



One Type Portable Belted Grinder.

ments from striking the operator and, if the wheel should break, it would strike inside the flanges of the channel and be prevented from flying.

Complete details, prices, etc., will be forwarded to those interested by the Saint Louis Machine Tool Co., "902" Loughborough Ave., St. Louis, Mo.

You Have a Real Shop Helper in the Utilitool.

If you haven't made the acquaintance of the Utilitool yet you've missed meeting a real shop friend, for this is a piece of shop equipment that is just what the name implies—a utility tool.

Welding experts will tell you that material to be welded should be beveled before welding. To secure the best weld the work should be ground as it gives a good, clean surface to work on. The Haskins Utilitool is designed to handle this work in the most satisfactory way possible. It will also enable you to finish your work properly and well finished work pays better and is no harder to produce.

It is also a handy and efficient drill, operating up to a ½-inch drill in cast iron or steel. With it the places that are usually hard for the workman to get at can be readily reached.

When clamped in the vise, the Haskins Utilitool makes an efficient bench or tool grinder. Drills, chisels and other sharp-edged tools, as well as small castings and parts, can be readily sharpened or ground.

A special brush is provided with the Haskins Utilitool for removing carbon from cylinders, and performs the operation in a

few minutes. This equipment, it is stated, is being used for carbon removing in some of the largest service stations and on the higher-priced cars.

Haskins flexible shaft equipments have been used in the leading industries for years, and so are tried and proven. The Utilitool is a Haskins machine and is especially adapted to the garage and repair-shop.

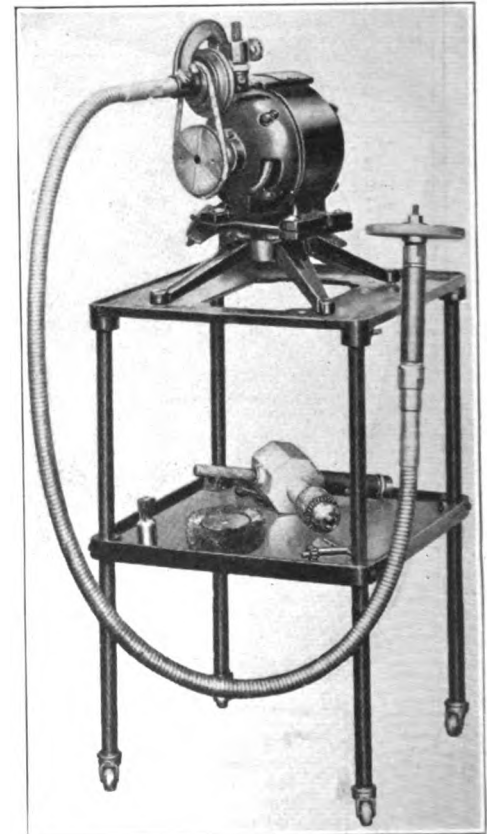
The R. G. Haskins Co., 25 South Desplaines St., Chicago, which manufactures the Utilitool, is issuing a very valuable booklet to those requesting it. This is entitled: "Questions and Answers on the Vulcanizing, Repair and Sale of Pneumatic Tires," and it presents a large amount of practical and helpful information on the vulcanizing and repairing of tires that will be found useful in any shop.

Since only a limited number of copies of this booklet are available for distribution, it would be well to make sure of your copy by promptly writing the R. G. Haskins Co. at the address given.

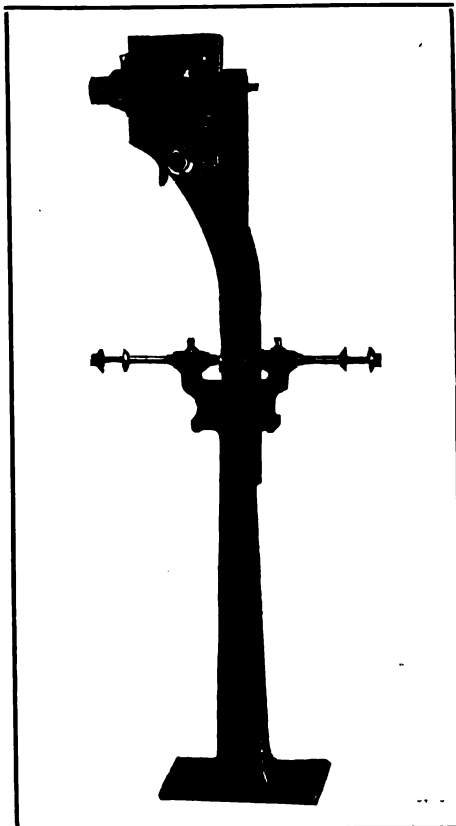
Bureau of Mines Reports Decline in Gasolene Stocks.

That the hum and purr of the automobile engine is more audible than ever, and that all America has taken to wheels, is indicated by the announcement by the Bureau of Mines that gasolene stocks in the United States, which have been steadily mounting to new high record marks, are now on the decline.

On June 1, stocks on hand at the refin-



Utilitool Means Properly Finished Work.



Polishing Machine Nos. 1, 2, 3.



A line that
will pay
you to sell

SUPERBESTOS Folded and Stitched BRAKE LINING

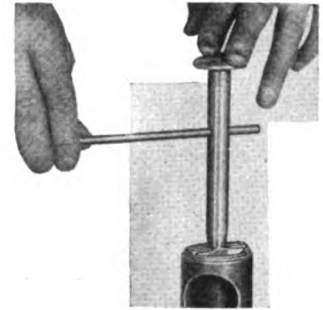
outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.

DEALERS and REPAIRMEN—
Write for data and prices on brake
lining, clutch facings, Ford Trans-
mission lining, running board mats
and packings.

Manufactured by
MIKESELL BROTHERS COMPANY
156 No. La Salle St., Chicago, Illinois
Plant and Works, Wabash, Indiana



Grinder
Accuracy at
a Hand-tool
Price



CUTTING thru a heat-scaled valve seat with the pressure of two fingers, is a simple matter with this shear cutter reseter.

Cutters taking $1\frac{1}{8}$ " to $3\frac{1}{8}$ ", and four pilots enable you to reset any valve with this Skinner Motor Valve Set. This set includes our new filing refacer which with its accurate guide bearing, puts a true seating surface on even a warped tungsten valve head. Write for treatise on valve work.

**M. B. SKINNER CO., 562
Washington Blvd., Chicago**

SKINNER

MOTOR VALVE SETS

"PRO-TEX-OIL" THE MIRACLE LUBRICANT

FOR FORD CARS and FORD TRUCKS

"PRO-TEX-OIL" is a high grade, natural, rich automobile oil, refined from Pennsylvania Crude, manufactured and compounded in such a way as to permit it to retain a larger percentage of lubricating fat than through the ordinary refining process. Through the process in which we manufacture this oil, it retains its natural lubricating fat which greatly improves the lubricating qualities and accomplishes its most important object which is THE ABSOLUTE ELIMINATION OF CHATTERING in Ford cars and Ford trucks.

It is a known fact that by not stopping this chattering when you have the means of doing so (using our "PRO-TEX-OIL") you are absolutely shaking your Ford car into the repair shop and this means a big additional expense.

By eliminating the chattering you eliminate the loose bolts and nuts in all parts of the Ford car or truck. Practically all transmission troubles and rear axle troubles are caused by this unnecessary chattering.

"PRO-TEX-OIL" eliminates the changing of brake-bands to stop the chattering. The result is that PRO-TEX-OIL will give more mileage on oil and gasoline, more power, no excess carbon, and the absolute elimination of the

annoying succession of jerks and jars you get every time you brake down your car or reverse it.

A Ford car or truck is usually selected from the standpoint of economy and it really lives up to its reputation in this respect. Automobile Oil is practically the most important part of your car, therefore, our "PRO-TEX-OIL" is the most important and should have first consideration.

"PRO-TEX-OIL" IS THE GREATEST SHOCK ABSORBER OF THEM ALL—absolutely no annoyance from bumps and shocks when applying the brakes if you use our "PRO-TEX-OIL" for your Ford cars or trucks.

OUR GUARANTEE

"PRO-TEX-OIL" is guaranteed to immediately stop the chattering in the brake-bands, to increase the power and leave no excess carbon residue. By that we mean the carbon residue from PRO-TEX-OIL is less than that from other oils as "PRO-TEX-OIL" is refined from Pennsylvania Crude.

"PRO-TEX-OIL" is the greatest achievement in Ford automobile lubrication.

Dealers and Jobbers Wanted: Territory going fast; write or telegraph for territory.

THE REPUBLIC PRODUCTS COMPANY

**PROSPECT BUILDING
CLEVELAND, OHIO, U. S. A.**

"I am very much pleased with the AMERICAN GARAGE and AUTO DEALER. I got one idea from you that will just double my sales in 1922."

WM. J. BRAUN,
Braun Vulcanizing Co.
Wahpeton, N. Dakota.

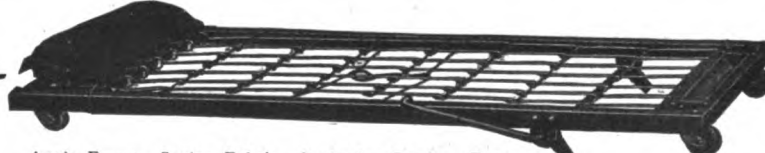
KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by
THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.
Canadian Branch Factory at Woodstock Ont.

Foster

Auto Repair Creeper
METAL CONSTRUCTION



Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

FOSTER BROS. MFG. CO., UTICA, N. Y., U. S. A.

\$5.00

Ask for the name of the Foster distributor in your territory.

DIRECT REPRESENTATIVES

Eastern and Southern States: Asch & Co., 16-24 W. 61st St., New York, N. Y. For the Mid-West: Jessop & Thompson, 1421 S. Michigan Ave., Chicago, Ill. Pacific Coast & Inter-mountain Territory: McDonald & Linforth, 739 Call Bldg., San Francisco, Cal.

eries amounted to 856,607,102 gallons, which is 35,661,000 gallons below the record figure of 892,267,766 gallons attained at the beginning of May. The fact that the billion-gallon mark, forecasted in some quarters, was not reached seems due to the tremendous increase in domestic consumption of gasoline, which amounted to 499,242,343 gallons in May.

This figure represents an increase in domestic consumption of gasoline of 113,000,000 gallons over the month of April and 145,000,000 gallons over the month of May, 1921. Gasoline consumption figures for May constitute a record for that month, and are within four million gallons of the record-setting figure attained in August, 1921, although occurring three months before the customary month of largest consumption.

Production of gasoline in May amounted to 513,658,966 gallons, an increase of 41,000,000 gallons over the month of April. The sharp increase in gasoline consumption, however, was sufficient to offset the increased production and to inaugurate the seasonal decline in stocks a month earlier than it usually occurs.

Reports to the U. S. Bureau of mines show that 315 refineries operated during May, an increase of 12 as compared with the previous month. Plants reporting during May were running an average of 85 per cent of their daily indicated capacity. Exports of gasoline for May amounted

to 55,823,839 gallons; imports were 7,104,879 gallons; and shipments to insular possessions were 1,358,327 gallons.

Production of fuel oil set a new record in May, amounting to 936,742,331 gallons. The previous monthly production record of this product was 859,000,000 gallons attained in December, 1921. Stocks of gasoline and fuel oil on hand June 1 were 1,321,437,972 gallons, an increase of 38,000,000 gallons over the previous month.

Of interest to automobile users is the announcement that stocks of lubricating oils showed a decrease of 10,837,000 gallons from the figures for the previous month. The production of lubricants in May amounted to 79,848,372 gallons, an increase of approximately 7,000,000 gallons over April, but increased consumption of these products affected a reduction in stocks to a figure of 226,293,334 gallons as compared with 237,229,814 gallons on hand May 1. It is estimated that approximately 60 per cent of the lubricating oils produced are consumed by automobile users.

Stocks of kerosene on hand June 1

amounted to 318,890,131 gallons. Production and stocks of kerosene show a decrease for the month of May.

Three Thousand Motor Vehicles in Yugoslavia, Reports U. S. Consul.

There are about 3,000 motor vehicles in Yugoslavia, including a small number of trucks, says U. S. Consul Patton, Belgrade, in a report to the rubber division of the Department of Commerce. Ninety per cent of the passenger cars use millimeter clincher tires, 7 per cent inch clinchers, and 3 per cent straight sides. Cord tires have only made their appearance during the past year and are gaining favor. Only 2 or 3 per cent of the cars are now using them.



TIRES, Tubes, Storage Batteries, Spark Plug, Piston Rings, Tools, Chains, Oils, Greases, etc., of highest quality are available under the Culp-Plan.

If you buy such merchandise commercially, write for Culp-Plan facts, or ask any live dealer—he knows!

GEORGE K. CULP, Inc.
56 West 45th Street New York

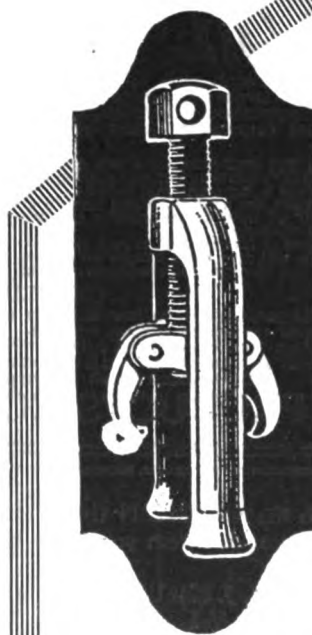
Every Tire Dealer Using AMERICAN GARAGE & AUTO DEALER

Should get on our mailing list

Write or wire
for our latest
Bulletin just
off the press

It is a real Money Saver
and will be sent
upon request to
those in the trade

BROADWAY TIRE JOBBERS, Inc.
250 W. 54th Street, New York City



"HURRAH!"

as the boys say. Valve cleaning is easy now! The Buffum Buick Valve Remover makes it so.

No longer do you have to use the clumsy crowbar to remove valves. No longer will your customers complain about broken seats, or springs or washers. You can keep the Buffum Buick Valve Remover handy and do the work of valve removing quickly and easily.

Take advantage of our dealer proposition. See that your customers who have Buicks have a Buffum Buick Valve Remover for their own use. They will appreciate the good work of the tool when they are trying to locate trouble on the road, and they will appreciate the difference in the operation of their cars after the carbon has been cleaned from the valves.

For you and for your customers, the Buffum Buick Valve Remover is the tool.

The retail price is \$2.00. And the tool is backed by our guarantee.

BUFFUM TOOL CO.

Factory and General Offices
4th and N. Carolina Sts., Louisiana, Mo., U. S. A.

Pioneer Trailer Camps

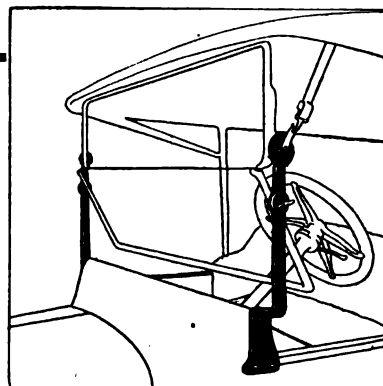
Offer every garage man and dealer a splendid opportunity to "cash in" on the new and highly profitable recreation—

Auto Touring and Camping

Last year a million motorists enjoyed this "out-door sport." This year the number is conservatively placed at a million and a half. This new phase of the automobile industry is growing by leaps and bounds. It is up to you to get your share. We can help you do it. Write today for catalogue, prices and dealer's discounts.

Dept. C

Continental Auto Parts Co.
COLUMBUS, INDIANA



LIST PRICE \$5

Breeze Brackets sell fast these hot days. You know what joy it is to have your windshield scoop a cool stream of air into your lap and down onto the hot floor of your car. Five dollars does not begin to pay for the comfort. Yet that is all you charge for Breeze Brackets. They sure sell at such a price.

BREEZE BRACKETS

A Big Summer Seller for Fords

Breeze Brackets are a hot weather blessing for the Ford owner. He can open the lower windshield, in or out, and direct a cool breeze down into the hottest part of his Ford. You can sell him several thousand miles of genuine comfort for only \$5. Can you blame him for buying? Not much! Breeze Brackets are easy to install. No holes to drill. Just take off the old bracket and put the new one in its place. Use the old glass.

They are big sellers everywhere right now. The coupon brings complete information. Let us send you a sample set, \$3.75 postpaid. (Check, Cash or M. O.)

BUCKSTAFF BREEZE BRACKET CO.

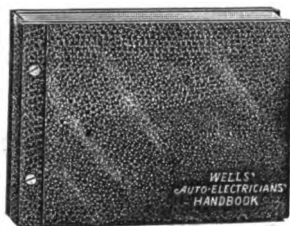
702 "O" St., Lincoln, Nebr.

Buckstaff Breeze Bracket Co., 702 "O" St.,
Lincoln, Nebr.

Please send me information on Breeze Brackets.

Name

Address



Does Your Auto-Electric Service Sell Results, or Only Your Hours of Work?

It's a simple case of add and subtract—

One Hour's Time (plus Wells' Auto-Electricians' Handbook)\$4.50

One Hour's Time (plus Lots of Hard Work and Worry) 1.50

Are you losing, or do you want to make the difference of\$3.00

There are forty reasons why Wells' Handbook is the biggest money maker in the electric service shop—here are three of them:

First— **PERFORMANCE, ADJUSTMENTS, TEST METHODS, CONSTRUCTION.** From 1911 to now, on 1324 models of 170 different makes of cars, for their **GENERATORS, MOTORS, REGULATORS, CUT-OUTS.**

Second—Real working diagrams, in blue print, of the internal wiring of each unit—with every brush, coil and terminal shown in its actual position as in the machine.

Third—Exact and specific instructions for each different make of machine—with real "brass-tack" information and no glittering generalities.

Do you want to know HOW and WHY Wells' Auto-Electricians' Handbook will make money for YOUR shop?

Then write today for sample pages and a complete description.

It's easy to buy—and easy to pay for, too.

AUTOMOTIVE PUBLISHING CO.

448 S. Dearborn St., Chicago, Ill.

Battery and Service Men

Are you handling the STEWART? SATISFACTORY BATTERY?

SATISFACTORY to the dealers because of **PRICE.**

SATISFACTORY to purchasers because of **PERFORMANCE.**

SATISFACTORY—all 'round.

Write for our Satisfactory and Profitable Exclusive Selling Plan with Dealers' Help.

Stewart Storage Battery Co.
MARSHFIELD, WIS.



Our exceptional selling plan and sales co-operation offer one of the biggest inducements ever known in the automotive line. Your territory may be open. We want to meet dealers alive to STEWART'S exclusive agency sales plan. Write us today, stating your business responsibility complete.

The Garage *and* Shop Market Place



JOBBERS — DEALERS!

Are you prepared to supply the demand for Trindl Piston Pins?

Trindl Piston Pins are the best pins you can buy. They are special heat treated which gives them a hard surface of about 1/32" in depth —accurately ground and tested to 1/10 of 1/1000th of an inch.

We carry an enormous stock of piston pins for all makes of motors, standard and oversize for immediate shipment. Specials on 24-hour notice. Quality, price and service makes us your most logical source of supply.

Send for Our Piston Pin Specifications and Price List.

The TRINDL CO. 2917 SO. WABASH AVE. CHICAGO

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We have just the style of

Double Lattice Truss

that you need—adaptable to spans up to 125 ft. Eliminates all posts. Strong and sightly. Constructed right on the ground where the building is going up. Guaranteed to carry any snow load.

Leo McDaniel

Contracting and Engineering Co.
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Liquid Cooling Apparatus

Especially designed for automotive engines; a demonstrated success; apparatus does not require a fan for cooling the water. Eliminates trouble and annoyance of clogged cooling system; obviates danger of frozen radiator and tubes. Creates new method for displacing and cooling water. Dispenses with pump. Makes a neat appearance; can be used with any make or design of automotive engine.

Further particulars on request

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Central Indiana Manufacturers now Marketing an entirely new Auto Accessory that makes night driving safe, eliminating glare from approaching headlights, want general sales managers to open branch office, handle exclusive territory and manage salesmen. Some investment necessary. Profit possibilities practically unlimited. Ray Filter Co., Marion, Ind.

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Handle practical R & M rim tool for demountable auto rims. For particulars write B. E. Woodcock, 303 Coal Exchange Bldg., Scranton, Pa.

ANDRE G. CATELAIN

General Automobile Machine Work, Welding of All Metal—Authorized Ever Ready Battery Service Station—Sheet Metal Work—Manufacturer Catelain Hose Coupling—Sales and Service U. S. E. Shock Eliminators. 1446-8 Indiana Ave., Chicago, Ill.

More Customers — Bigger Profits

THE TOPSY-TURVY AUTO REPAIR RACK

Enables you to make repairs and inspections in half the time; get better work done; give prompt, quick service; earn bigger profits; make a reputation for efficiency; attract more customers and keep them.

You can't afford to be without a Topsy-Turvy Rack. A wonderful investment and the greatest business booster you ever had. Special inducement to first purchaser in each locality. Write today and be the one to win this.

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Imperial Building, Chicago, Ill.

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HOPLAND, CALIFORNIA

W. A. MORRISON, Proprietor

Auto Supplies, Tires, Tubes

Gasoline, Oil and Free Air

BATTERY SERVICE STANDARD PRICES

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PHONE 172

CYLINDER REGRINDING

Standard and Oversize

PISTONS

PISTON RINGS PISTON PINS
ALL WORK INSPECTED

With our **BU-NITE PISTONS**

Goos a **GUARANTEE**
of **SATISFACTION**

Standardized Prices
Material and Workmanship Guaranteed
Modern Equipment
Skilled Mechanics

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"Service by the Golden Rule"

(AUTOMOTIVE ELECTRICAL
EQUIPMENT)

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Tel. Calumet 1100

Jobbers—Distributors—Service Station

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Build your own test equipment from my thoroly tested plans, and save hundreds of dollars. Complete plans and specifications for following articles postpaid upon receipt of price:—Test bench, \$1.50; Armature tester, \$1.00; Ignition tester for all systems, \$1.00; Magnet charger, 50c; High-rate discharger, 50c; Growler, 50c; Ford coil tester, 50c; Set of diagrams, showing interiors of nearly all coils, \$1.50; All of the above complete, \$6.00, including **FREE CONSULTATION SERVICE FOR SIX MONTHS.**

Satisfaction guaranteed.

Automotive Electro Technologist
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WHY GIVE AWAY YOUR PROFITS?

The simplicity of operation of "The York" cylinder boring machine, its rigidity, sturdiness and compactness, are just a few of the admirable features resulting from the high "quality" of York construction.

This portable machine tool will bore all motor blocks—passenger car, truck, tractor—within its capacity, $2\frac{1}{4}$ " to $5\frac{1}{16}$ ". Precision and accuracy are insured.

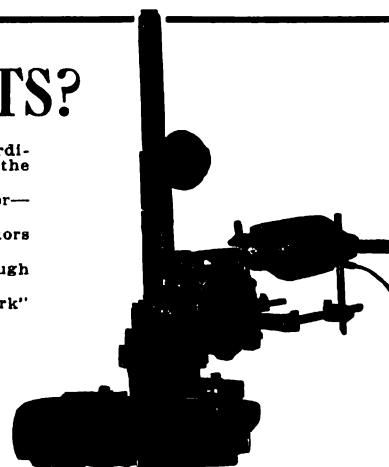
Gear driven throughout and operated by hand or power. Detachable Head Motors may be rebored in the chassis.

"The York" is packed in heavy oak case, with convenient compartments. Thorough instructions furnished.

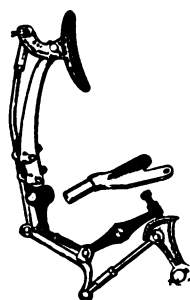
With care, cleanliness, and good judgment, it's mighty easy to operate "The York" with success.

Wire or write for complete particulars.

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TWO FORD ACCESSORIES TO INCREASE YOUR SUMMER SALES

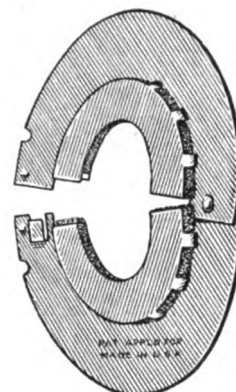


THE B & C NEUTRAL PEDAL

No more guesswork as to neutral position. The B & C provides a positive determined neutral position, independent of emergency brake connections. Quicker to start, quicker to stop, quicker to reverse with the B & C. Every customer who has a Ford will need the B & C and want it.

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Keeps the motor from overheating, prevents fan belt's slipping, by taking care of oil and keeping belts dry. Made of steel parts hinged and provided with catch for locking in position on crankshaft. Felt gasket absorbs and throws off oil before it reaches belt. Assures motor efficiency.



Write for prices today.

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Prime with Heat

Packard, Franklin
and Lincoln do.

43,767 Accessory Dealers

in U. S. and Canada

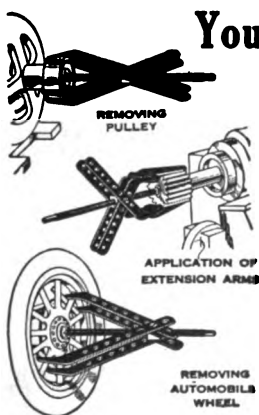
Many responded to our June advertisement. If you **knew** the practical value of our device, **you** would co-operate also. It is physically impossible to see all of you personally before the selling opens. Just write for our special introductory offer and we will prove that the

POMEROY PATENTED ELECTRIC GASAFIER

will increase your profits. Guaranteed to start any car instantly in coldest weather—increase mileage—save battery—make hill-climbing easy—outlast the car. Price \$5. Sold in 38 states and abroad. Exclusive sale may be open in your territory.

POMEROY ELECTRIC CO., Inc. Mfrs., 40 East Main St., Rochester, N. Y.

You Need One or Both These Gear and Wheel Pullers

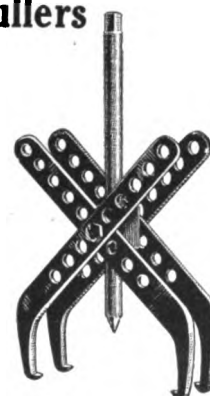


The "LITTLE GIANT"

pulls any gear, wheel or pulley—anywhere—in a jiffy. Built on the only correct principle—produces maximum efficiency with minimum effort. Can't twist off or let go. Made of best grade drop forge steel. Adjustable up to 13" diameter. Price complete with extension arms \$12. Satisfaction guaranteed or money refunded. Order one today or write for data.

"BIG BUSTER"

This heavy duty puller is designed to cover a range of work upward from where the "LITTLE GIANT" and other tools leave off. Weighs 100 lbs.—open adjustment 40". Pulls heavy motor truck and car wheels, ship and aeroplane propellers, heavy fly and gear wheels, transmissions, etc., easily. Can't slip off work—no arm locks required. Price complete with wrench and handle, \$50. Where you have a job no other puller will touch you need a "Big Buster."



"THE HARDER THE PULL—THE TIGHTER THE GRIP"

Write for dealers' discounts and literature

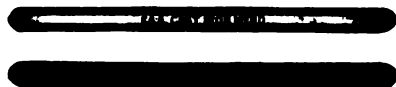
Premier Electric Co., 3802 Ravenswood Ave., Chicago

LET'S HAVE THAT NEXT ORDER!

**When you need a Doctor
Do you get estimates?**

NO! you engage a Physician in whom you have confidence. That's why you use F.A.A. ALUMINUM and CAST IRON MENDS. You have confidence in them in making permanent repairs, such as scored cylinders, cracked water jackets and aluminum castings.

**F. A. A. Aluminum and Cast Iron
Mends go straight to the job.**



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WANTED**

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Western Distributor
CARL M. ANDERSON, Vineburg, California

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*Auditor, Accountant, Systematizer
Specialist in Automotive Accounting*

**Audits, Investigations, Surveys, Systems
Income Tax Reports**

**Monthly Balance Sheets and
Operating Statements Prepared.
Unit and Process Costs Established.**

**322 South Fourth Street
Phone Atlantic 1810
Minneapolis, Minn.**

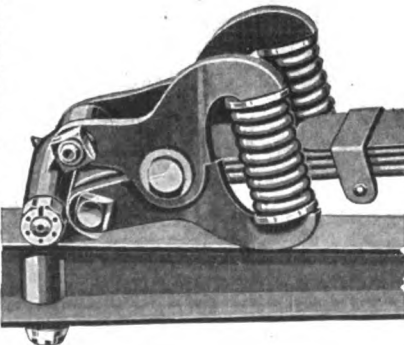
**Cash Journals, Sales Journals, Ledger Leaves,
Purchase Journals, Car Records, Truck Records,
Storage Tags, Shop Cards, Duplicate Statements,
Special Forms, Purchase Orders, Invoices,
Sales Books, Blank Books, Loose Leaf Binders.**

*We Specialize in Systems for Automotive
Dealers*



Star W-X Outshines All Other Ford Shock Absorbers

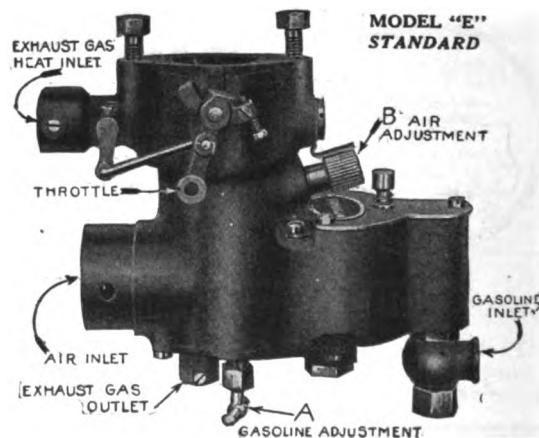
Give the greatest flexibility and comfort on either a normal or full load. Do not affect spring mounting of Ford Car. Simplest and easiest to install—car owner can do it himself. The biggest shock absorber ever offered at the price—\$3.00 per set of four. Three styles—No. 1 for Runabouts, No. 2 for Touring, No. 3 for Sedans. DEALERS—Here's a real money maker. Write today for full data.



STAR SPECIALTY MANUFACTURING CO.

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CHICAGO, ILL.



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

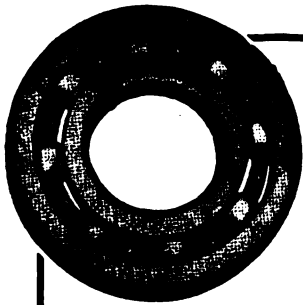
ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.

FLINT, MICHIGAN, U. S. A.



WESTERN GUARANTEED REBUILT BEARINGS

You can save 50% on replacement bearings by sending the old ones to us for rebuilding. Our rebuilt bearings are equal in all respects to new ones—they are fully guaranteed.

We will replace any used bearing you have with a Western guaranteed rebuilt—or, if beyond repair, will sell you a new or rebuilt bearing at a great reduction in price.

We are headquarters for rebuilt bearings, new ball and roller bearings, and steel balls—all makes.

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INSTANSEAT seat Instantly PISTON RINGS

Dealers say—"It pays to handle INSTANSEAT rings because:

Customers desire *quick results*—
Preventing passage of excess oil
guarantees *against come-back jobs*—
Individual virgin grey iron castings
insure *good results after long usage*—
and because

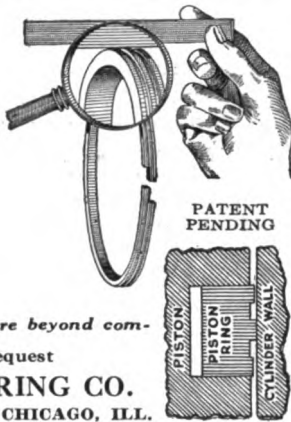
Quality, prices, and discounts are beyond comparison.

Sample ring mailed on request

KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL.



INSTANTLY TELLS YOU THE MAGNETO'S CONDITION



Sterling
MAGNETO METER

is a complete and accurate instrument made with special regard for convenience and speed in testing Ford magnetos.

Contains a standard Sterling A. C. voltmeter. Will quickly save its cost in time saved! Price, \$8.50 complete.

Other Sterling Products—
Pocket and Dash Meters, High Rate Cell Testers,
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Ask your jobber or write for Bulletins.

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Over 2 million Sterling Electric Devices in use today.

CLEVELAND, O.

STORM

CYLINDER REBORING MACHINES

**World's Standard for Speed
Accuracy and Reliability**

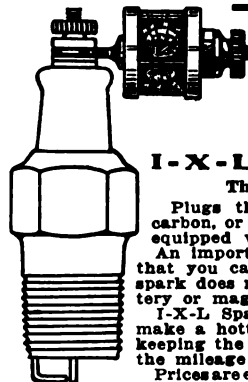
Made in All Sizes from Small Hand
Tools to Large Vertical Boring, Bur-
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Capacities to Meet Your Requirements.

Write Today for Complete Catalog
Covering Storm Equipment

STORM MFG. COMPANY

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First Aid to Motor Ignition

When spark plugs are worn out or the
insulation is broken there is still a lot of
good service in them if equipped with

I-X-L Spark Plug Intensifiers

They overcome spark plug troubles

Plugs that have become fouled with grease or
carbon, or have broken porcelain fire perfectly when
equipped with them.

An important advantage of the I-X-L Intensifier is
that you can see the spark from any angle. If the
spark does not show the motorist knows that the bat-
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I-X-L Spark Plug Intensifiers are adjustable—they
make a hotter explosion, increasing engine power and
keeping the cylinders free from carbon. They increase
the mileage on every gallon of gasoline used.

Prices are extremely moderate. Dealer profits are liberal.

Write today for full particulars.

UNIVERSAL MFG. & SALES CO.

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**SEAL
FAST**



**Mends punctures
and blow-outs
TO STAY
MENDED**

This is the original, the genuine, no heat, no cement, no gaso-
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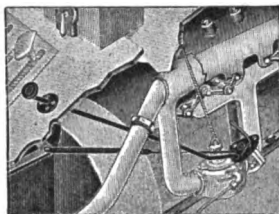
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Every Ford Owner needs a foot accelerator. Meet this need with the Ewald and cash in. Ewald accelerators operate independently of the hand throttle and are entirely unaffected by road jolts and jars.



They are easily installed in a few moments time

Dealers and Jobbers—Write our sales dept. today for full details

Manufacturers
ROMORT MFG. CO.
OAKFIELD, WIS.

Price 75c

Sales Dept.
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1321 Michigan Ave.
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WATERVLIT SPIRAL EXPANSION REAMERS

They Will Not Chatter!

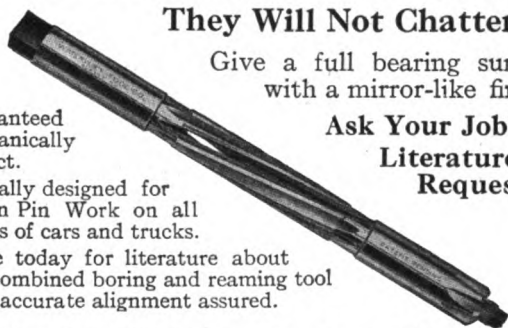
Give a full bearing surface with a mirror-like finish.

Guaranteed mechanically perfect.

Specially designed for Piston Pin Work on all makes of cars and trucks.

Write today for literature about this combined boring and reaming tool with accurate alignment assured.

Ask Your Jobber.
Literature on Request.



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INCREASE YOUR PROFITS BY MEETING THE DEMAND FOR THE ONLY MONEY GUARANTEED BURST PROOF REPLACEMENT RADIATOR FOR FORDS.

The Jaffe \$100.00 Reward Guarantee has a wonderful appeal for your customers. It is the greatest selling feature ever offered the trade. It means big JAFFE sales for you.

Write for the JAFFE Yellow Book and our new three-color display signs, imprinted with your own name and address.

Jaffe Radiator Co.
741-D W. Van Buren St.
CHICAGO, ILL.

\$100.00 REWARD!

The JAFFE RADIATOR COMPANY will pay \$100.00 reward to anyone who can prove that the core of any JAFFE radiator can be damaged by freezing.



Belted Motor Grinders And Polishers

Standard machine with a standard induction, (not split phase) motor or D. C. Fused switch. Endless belt. Proper speeds—mile a minute for abrasive wheels—mile and a half for polishing wheels, or any special speed desired. During July and August only: No. 1 complete with 6x1 inch wheels, \$60.00. No. 2 complete with 10x1½ inch wheels \$75.00. No. 3 complete with 12x2 inch wheels, \$95.00. We make 118 different sizes and types of grinders and polishers. Don't miss a dandy buy! Send for details—now.

Saint Louis Machine Tool Company

902 Loughborough Ave.

St. Louis, Mo.



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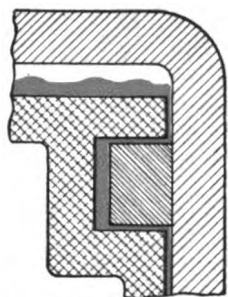
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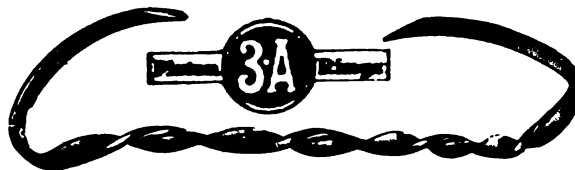
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Conventional and other multiple price rings leak oil around the groove.



Try this on any other ring!

Hold compression, keep spark plugs from fouling, keep oil out of the combustion chamber.

The spring against the ring does the work

3-A Piston Rings are so constructed that they will take care of cylinders at least .003 out of round, even when installed on aluminum pistoned motors, so that reboring is seldom necessary.

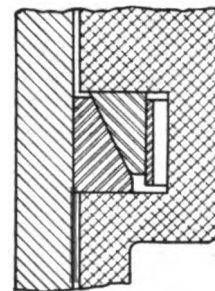
Write for Circular 25

Some territory still open

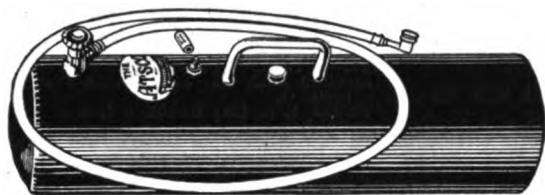
STEEL SPRING PISTON RING CO.

147 Metropolitan Ave.

BROOKLYN, N. Y.



3-A Piston Rings not only fill the groove, but have the same one-piece bearing surface as the conventional type ring.



You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

Pittsburgh, Pa.

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Trade Mark Registered

SOLDERING SALTS

for soldering all metals—just dissolve in water and the flux is ready. Harmless, quick-acting — just the thing for automobile repairs.

Buy it from your jobber in ¼ lb., 1 lb., and 5 lb. cans.

New Prices for 1922.

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Hudson New York



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REPUTABLE mechanics know the value of side expanding rings. This statement is proven by our large business with repair dealers.

Over 90% of sales are repeat orders.

V-Plex rings embody many other special features of particular importance—may we explain them to you?

Exclusive county and sectional representatives for this remarkable, self-adjusting-to-wear-in-all-directions ring are being appointed. Possibly the agency for your district has not yet been assigned. Find out. Write now.

Exclusive county and sectional representatives for this remarkable, self-adjusting-to-wear-in-all-directions ring are being appointed. Possibly the agency for your district has not yet been assigned. Find out. Write now.

KRASBERG PISTON RING CO.

538 Lake Shore Drive

CHICAGO, ILL

You Don't Guess the Answer

You READ It on the Blade

Cylinder measurements guaranteed accurate to within .00025" and less.

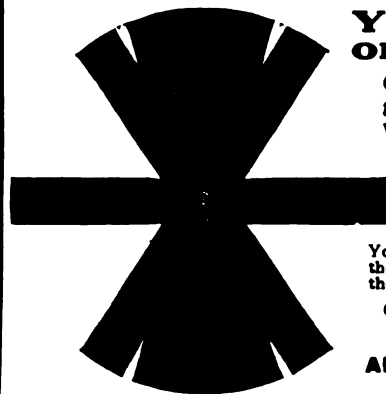
The AM-PÉ-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and instantly read the correct measurement.

Get the whole story in our circular.

PRICE \$1.75

AM-PÉ-CO SALES CO.
Marshalltown, Iowa



The Carbon Remover That Increases Sales

A FAST-SELLING article, with an unusual repeat sale value, Motor-Kleen will build up your general sales by winning customers' good-will.

Containing no acids, alkalis or ether, Motor-Kleen is guaranteed not to injure the metal of the engine or interfere with lubrication.

Full information will prove to your advantage. Write us today.

The Motor-Kleen Corporation

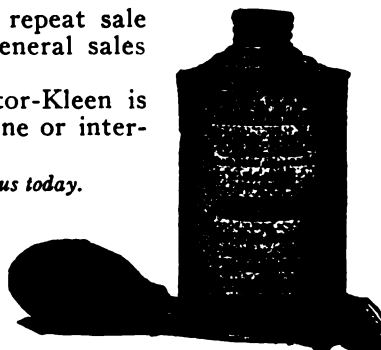
Factory and General Office:

Long Island City

New York

MOTOR-KLEEN
TRADE MARK

The Scientific Carbon Remover



Pint can (will clean 16 cylinders)\$1.00

Spray (assuring correct measure and complete distribution within the cylinder)30

MOTOR-KLEEN CORPORATION, New York
Long Island City, N.Y.
Enclosed find \$.....
Kleen and me
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Address
City
State
A.G.A.D.-7

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Champion Pneumatic Machinery Co., 8164 S. Chicago Ave., Chicago.
Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.
Globe Mfg. Co., Battle Creek, Mich.

AIR HOISTS

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

AIR TANKS

Air Tight Steel Tank Co., Pittsburgh, Pa.

AMMETERS (POCKET and DASH)

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, Ohio.

ANTI RATTLES (Window)

Autoquip Mfg. Co., 495 W. St. Paul St., Rochester, N. Y.

AXLES (EMERGENCY)

H. G. Paro Co., 1410 S. Michigan Ave., Chicago.

BATTERIES

Stewart Storage Battery Co., Central Ave. at Sixth St., Marshfield, Wis.

W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

BATTERY REPAIR & TESTING EQUIPMENT

W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

BEARINGS

Western Bearings Co., 2831 S. State St., Chicago, Ill.

BOOKS

Automotive Publ. Co., 448 S. Dearborn St., Chicago.

BOOKKEEPING AND ACCOUNTING SYSTEMS

Comfort Printing Specialty Co., 101 No. 8th St., St. Louis, Mo.

BORING MACHINES

Winterknight Equipment Co., 1327 Race St., Philadelphia, Pa.

BRAKE AND TRANSMISSION LININGS

Mikecell Bros. Co., 156 N. La Salle St., Chicago.

BREEZE BRACKETS

Buckstaff Breeze Bracket Co., Lincoln, Nebr.

BUMPERS

Metal Stamping Co., Long Island City, N. Y.

BUSHING REMOVERS

Albertson & Co., Sioux City, Iowa.

CARBON REMOVERS

Motor Kleen Corporation, Long Island City, N. Y.

CARBURETORS

Marvel Carburetor Co., Flint, Mich.

CLEANERS

States Chemical Co., 680 W. Austin Ave., Chicago.

CLUTCH FACINGS

Mikecell Bros. Co., 156 N. La Salle St., Chicago.

COUPON BOOKS

National Checking Co., 269 Chestnut St., St. Paul, Minn.

COVERS

Kennedy Car Liner & Bag Co., Shelbyville, Ind.

CRANES

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

CREMPERS (For Repair Shops)

Foster Bros. Mfg. Co., Utica, N. Y.

CYLINDER REBORING AND EQUIPMENT

Butler Mfg. Co., Indianapolis, Ind.

Storm Mfg. Co., Minneapolis, Minn.

Trindl Co., 2917 So. Wabash Ave., Chicago.

CYLINDER REGRINDING

Trindl Co., 2917 S. Wabash Ave., Chicago.

CYLINDER GAUGES

Am-pé-co Sales Co., Marshalltown, Iowa.

DISPLAY RACKS

W. L. Clark Co., 588 Pearl St., New York City.

DISTILLED WATER

Hinckley & Schmitt, Inc., Chicago, Ill.

ELECTRICAL REPAIRS

Sampson Electric Co., 2324 So. Wabash Ave., Chicago.

ELECTRICAL TESTING EQUIPMENT

Automotive Electro Technologist, Box 115, Fullerton, Cal.

W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

ELECTRIC FURNACES

Friesz Mfg. Co., 3416 N. Illinois St., Indianapolis, Ind.

ENGINE STANDS

Continental Auto Parts Co., Columbus, Ind.

FAN BELTS

Hide, Leather & Belting Co., 229 S. Meridian St., Indianapolis, Ind.

FIRE FIGHTING EQUIPMENT

Flexlume Sign Co., Niagara St., Buffalo, N. Y.

GARAGE EQUIPMENT

Continental Auto Parts Co., Columbus, Ind.

GASIFIERS

Pomeroy Electric Co., 48 E. Main St., Rochester, N. Y.

GASOLINE PUMPS AND TANKS

Wayne Oil Tank & Pump Co., Fort Wayne, Ind.

GEAR AND WHEEL PULLERS

Continental Auto Parts Co., Columbus, Ind.

Friesz Mfg. Co., 3416 N. Illinois St., Indianapolis, Indiana.

Premier Electric Co., 3800 Ravenswood Ave., Chicago.

GLAROSCOPES

Hayden Ohlson Company, 47 W. 42nd St., New York City.

GREASE GUNS

Frank Rose Mfg. Co., Hastings, Neb.

H. G. Paro Co., 1410 So. Michigan Ave., Chicago.

GREASE PUMPS

Adkins, Young & Allen, 561 W. Washington St., Chicago.

H. G. Paro Co., 1410 Michigan Ave., Chicago.

HOOD SILENCERS

H. G. Jorgenson, Hampton Road, Erie, Pa.

LENSES

C. A. Shaler Co., 372 Fourth St., Waupun, Wisconsin.

LIGHTING WIRE ASSEMBLIES

Turner Mfg. Co., Kokomo, Ind.

MAGNETO METERS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

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Britton Auto Products Co., 119 W. 63rd St., New York City.

NEUTRAL PEDALS

Burnham-Cote Co., Holyoke, Mass.

OIL GAUGES

Phillip Schaefer & Co., 20 E. Jackson Blvd., Chicago, Ill.

OIL PUMPS AND TANKS

Wayne Tank & Pump Co., Fort Wayne, Ind.

American Oil Tank & Pump Co., Cincinnati, Ohio.

OILS AND LUBRICANTS

National Refining Co., 2003 Rosa Bldg., Cleveland, Ohio.

Republic Products Co., Prospect Bldg., Cleveland, O.

OIL SHIELDS

Burnham-Cote Co., Holyoke, Mass.

PACKINGS

Mikecell Bros. Co., 156 N. La Salle St., Chicago.

PARTS SERVICE

North East Service, Inc., Rochester, N. Y.

PISTONS

Am-pé-co Sales Co., Marshalltown, Iowa.

Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON PINS

Burgess-Norton Mfg. Co., Geneva, Ill.

Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON RINGS

Butler Mfg. Co., Indianapolis, Ind.

Krasberg Piston Ring Co., 526 Lake Shore Drive, Chicago.

Kendall Engineering Co., Fort Wayne, Ind.

Leeseberg Machine & Mfg. Co., Fostoria, Ohio.

St. Louis Piston Ring Corp., 1807 So. Second St., St. Louis, Mo.

Steel Spring Piston Ring Co., 147 Metropolitan Ave., Brooklyn, N. Y.

Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON RING COMPRESSORS

Waglow Mfg. Co., 700 Manlius St., Syracuse, N. Y.

POLARITY INDICATORS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

PRESSES

Continental Auto Parts Co., Columbus, Ind.

PUMPS

Air-Tight Steel Tank Co., Pittsburgh, Pa.

Autoquip Mfg. Co., 495 W. St. Paul St., Rochester, N. Y.

Frank Rose Mfg. Co., Hastings, Neb.

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

RADIATORS

James Radiator Co., 741 W. Van Buren St., Chicago.

REAMERS

Watervliet Tool Co., Albany, N. Y.

RESEATING REAMERS

Albertson & Co., Sioux City, Iowa.

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RUNNING BOARD MATS

Mikecell Bros. Co., 156 N. La Salle St., Chicago.

SHOCK ABSORBERS

Indiana Parts Co., Richmond, Ind.

Star Specialty Mfg. Co., 227-233 W. Erie St., Chicago.

Phillip H. Webber & Co., Hoopston, Ill.

Federal Electric Co., 8700 State St., Chicago.

Flexlume Sign Co., 25 Kail St., Buffalo, N. Y.

SOLDER

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

SOLDERING FLUX

F. A. Albertus & Co., 206 9th St., Milwaukee, Wis.

Benson Co., A. R., Hudson, N. Y.

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

M. W. Duntion Co., The, Providence, R. I.

SOLDERING OUTFITS

M. W. Duntion Co., The, Providence, R. I.

SPARK PLUGS

Leich Electric Co., Genoa, Ill.

Allen Specialty Co., 2761 W. Lake St., Chicago, Ill.

SPARK PLUG INTENSIFIERS

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

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Compton Spring Oiler Co., 29 Broadway, New York.

SPRING LEAF LUBRICATORS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

TURNER MFG. CO., KOKOMO, IND.

Turner Mfg. Co., Kokomo, Ind.

SPRINGS

Garden City Spring Works, 2300 Archer Ave., Chicago.

New Era Spring and Specialty Co., Grand Rapids, Mich.

STORAGE BATTERY TESTERS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

TESTING INSTRUMENTS

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W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

TIMERS

Dale Mfg. Co., 1323 S. Michigan Ave., Chicago.

F. R. Mfg. Co., Fairbury, Ill.

Leich Electric Co., Genoa, Ill.

McCullough Mfg. Co., 216 High St., Boston, Mass.

Spad Mfg. Co., Inc., 42-B W. 39th St., New York City.

Turner Mfg. Co., Kokomo, Ind.

TIRES

Geo. K. Culp, Inc., 56 W. 45th St., New York.

Broadway Tire Jobbers, 250 W. 54th St., New York City.

Lincoln Tire & Rubber Co., 714 Prospect Ave., Cleveland, Ohio.

TIRE CARRIERS

International Stamping Co., 400 N. Leavitt St., Chicago, Ill.

TIRE CHANGERS

Hudson Products Co., Portland, Ore.

TIRE REPAIR EQUIPMENT

Robt. M. Bowes Co., Indianapolis, Ind.

Atlas Auto Supply Co., 680 W. Austin Ave., Chicago, Ill.

C. A. Shaler Co., Waupun, Wis.

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Turner Brass Works, Sycamore, Ill.

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Romort Mfg. Co., Oakfield, Wis.

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VALVE GRINDING COMPOUNDS

Abrasive Sales Corp., 17 E. 49th St., New York City.

VALVE REFACING TOOLS

Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.

VALVE REMOVERS

Bufum Tool Co., Louisiana, Mo.

VOLTMETERS (POCKET and DASH)

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

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C. A. Shaler Co., 353 Fourth St., Waupun, Wis.

VULCANIZING EQUIPMENT

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P. S. M. Co., Minneapolis, Minn.

Saint Louis Machine Tool Co., St. Louis, Mo.

WELDING EQUIPMENT

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F. A. Albertus & Co., 206 9th St., Milwaukee, Wis.

St. Paul Welding & Mfg. Co., 165 W. 3rd St., St. Paul, Minn.

WORK BENCHES (Portable)

Continental Auto Parts Co., Columbus, Ind.



Compresses All Rings on a Piston with One Operation

It doesn't "just happen" that the Cady Piston Ring Compressor is a time and patience saver and performs its work in a jiffy. The Cady Piston Ring Compressor is "made" to handle the work that way! It's entirely automatic and instantly adjusts itself to all size pistons within the range of $2\frac{3}{4}$ to $4\frac{1}{2}$ ins. Just draw the compressor over lower end

of piston a short distance, then place piston in the cylinder and with a little pressure on top of piston the spring at bottom of compressor automatically closes the rings as they enter the cylinder. Finished in white nickel. Price—\$2.50. Order this up-to-the-minute compressor—today.

WAGLEW MANUFACTURING CO.

700-702 Manlius St.

Syracuse, N. Y.

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

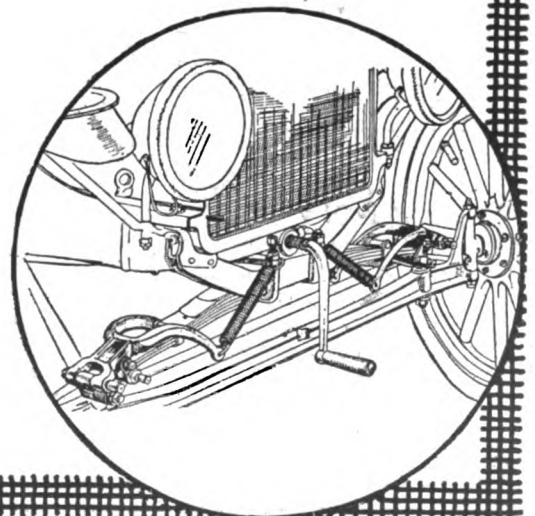
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.
London, Ont., Canada





Your customers will find a new pleasure and comfort in driving their Fords when they have a straight track ahead of them for the wheels to follow.

The "Steerite," attached to the tie rod and axle, automatically controls the steering apparatus. It prevents accidents in case the steering apparatus breaks, acts as a shock absorber to the entire front of car, and relieves constant strain to keep the car on "a straight and narrow path."

The "Steerite" allows full turning radius of the car, and without straining the steering apparatus. Takes up side motion of front wheels, thus giving about 20 per cent more wear to tires. Keeps radius rods from bending.

Seventy-five per cent of accidents to light cars are caused by steering gear control. You can offer your customers a real insurance against these accidents in "Steerite." Endorsed by the National Board of Underwriters.

A few desirable territories are still open for dealers and agents. Every Ford owner is a prospect for this all-year-round seller.

**Write
for
details**

STEERITE STABILIZER CO.

3rd and Walnut Sts.

243 Insurance Exchange Bldg.

PHILADELPHIA, PA.

**Retails
at
\$3.50**



Pour Portion of Salts Into Jar



Jar Fitted with Tight Cover

The Mechanic "Who Knows" Uses NOKORODE Soldering Salts

Here he is pouring a portion of the salts into a glass jar so that water may be added. NOKORODE SOLDERING SALTS cut with eight parts of water will solder all metals and will not burn the mechanic's hands or clothing.

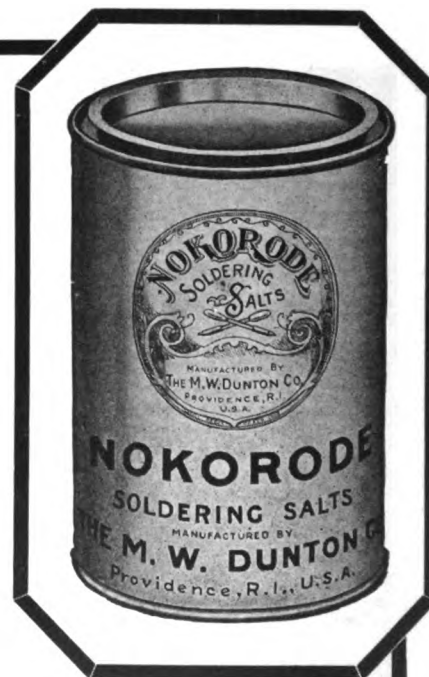
Then you can see him screwing the tight cover on the jar to keep out dirt and prevent evaporation. NOKORODE SOLDERING SALTS is absolutely non-corrosive and contains no acid. It assures a secure and permanent bond.

Introduce NOKORODE in your shop. For \$1.00 we will send you a one-pound can of NOKORODE SOLDERING SALTS, and guarantee to refund your money if NOKORODE SOLDERING SALTS does not satisfy you in every way. Write for a can without delay. You will be taking a step toward better soldering.

THE M. W. DUNTON CO.

Providence, R. I.

U. S. A.



FOR RADIO FANS
USE NOKORODE SOLDERING SALTS when you are soldering the connections on the radio outfit. It's effective and handy.



The Best Persuader for a Balky Ford is a **DALECO** Timer

"Trade Mark Registered"

Did you ever struggle with a balky horse?

You got mad all over and would have given most anything for a good "persuader."

It's just so with a balky Ford. Some boob yells "get a horse" and you want to commit murder.

There is just one real persuader for a balky Ford—A DALECO TIMER.

It will make that, or any Ford get right out and travel and keep traveling—not just for a little while, but for the life of the car, and the only way to make it balk again is to run out of gas—and that's your fault.

Another thing to remember—when you put a DALECO on a Ford it is there to stay, not for six months or a year, but as long as there is a motor attached to it. And one DALECO to a motor is enough. You will have no need for a spare or to carry extra parts, and further, the DALECO requires no lubrication.

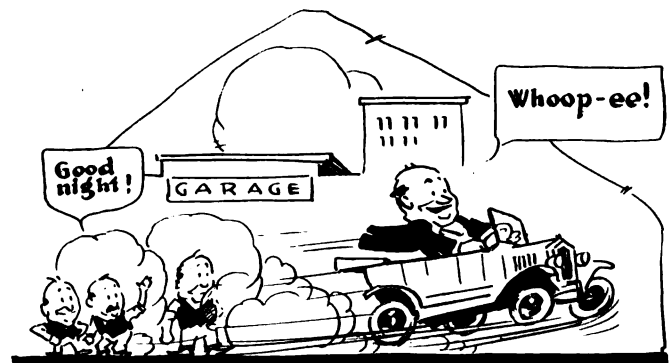
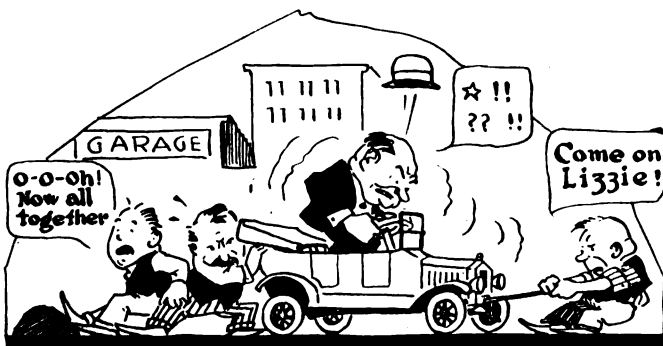
We back the statement and the DALECO TIMER with the most complete and comprehensive guarantee ever put on a timer and maintained by the maker, a guarantee we can afford to make because nothing depends upon you.

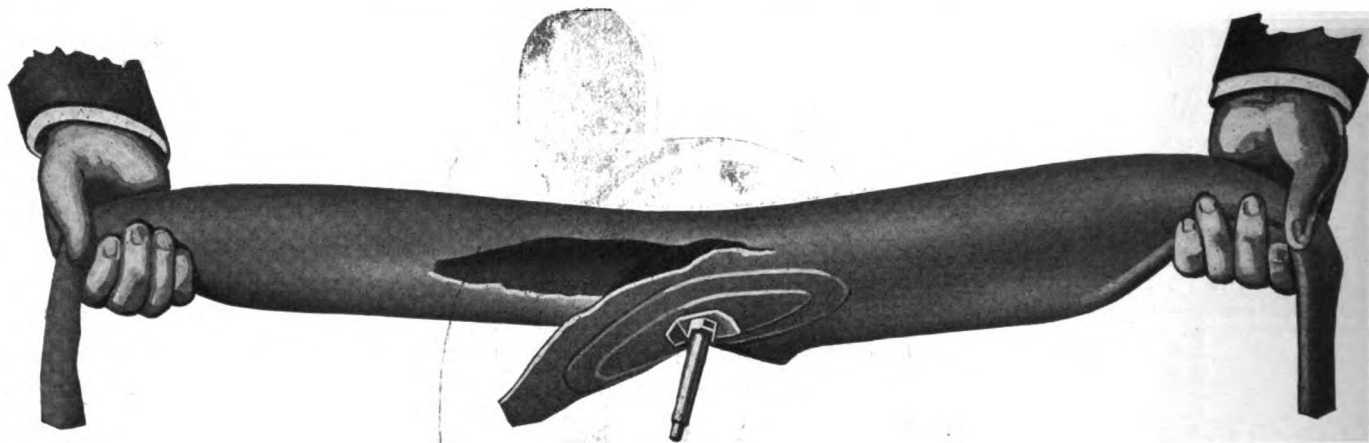
Other Timers require lubrication and attention, the DALECO does not, just install it right and leave it alone.

Dealers, if you do not already handle the DALECO write our sales department today for full details.

Manufacturers
DALE MANUFACTURING CO.
1323 Michigan Ave.
Chicago, Illinois

Sales Department
THE ZINKE COMPANY
1329 Michigan Ave.
Chicago, Illinois





Mr. Dealer! Think a minute! What have *YOU* got in stock that will mend *this* tear?

You'll admit that this would be a difficult job for a vulcanizing or patching outfit—but it's a **CINCH** for the genuine **TIRE-DOH**

When your customers ask for tire repair material you are giving them what they ask for, **WITH GOOD MEASURE**, if you sell them the genuine **TIRE-DOH**

The "Before" and "After" illustrations herewith are made from actual photographs of a torn tube which after being repaired, gave thousands of miles of service.

The genuine **TIRE-DOH** will make all kinds of tube repairs as well as keep casings in good condition. It's easy to use, economical and the *repairs are permanent*. We guarantee it to give satisfaction.

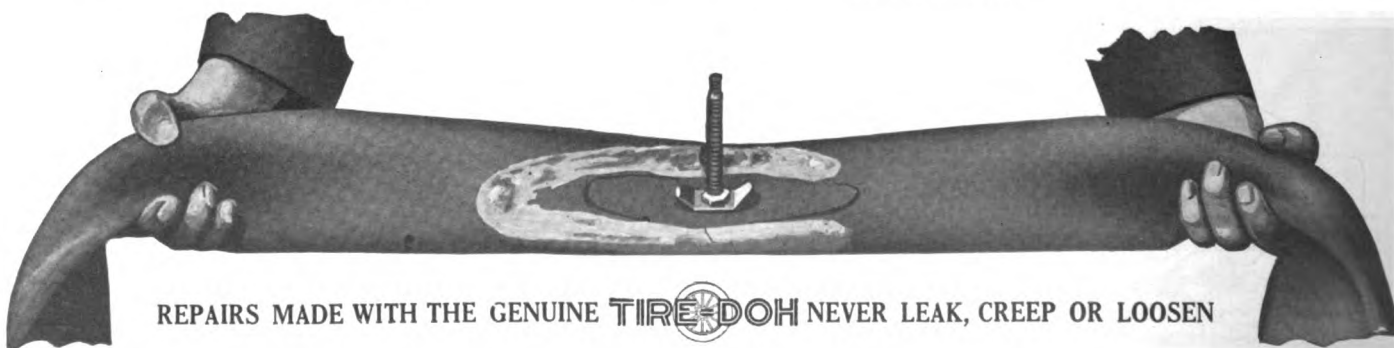
Free Sample Outfit. Write us for particulars and Dealer's Proposition

Atlas Auto Supply Company
680 W. Austin Avenue CHICAGO



The Genuine **TIRE-DOH** Outfit consists of One Can **TIRE-DOH** and One Can **TIRE-DOH** Cement—\$1.00 and 50c sizes.

The Original **TIRE-DOH** Repairs Anything that is Rubber.



REPAIRS MADE WITH THE GENUINE **TIRE-DOH** NEVER LEAK, CREEP OR LOOSEN

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

AUGUST, 1922

Vol. 13—No. 8.
10 Cents the Copy
\$1.00 Per Year.



Every User is a *Booster!*

Over 20,000,000 inner tubes were permanently repaired with the simple Shaler 5 Minute Vulcanizer last year, and every user is an enthusiastic booster who recommends the Shaler to his friends.

It's easier than sticking on a temporary patch—quicker than changing tubes—the only satisfactory method of making permanent tube repairs, anywhere on the road.

The Shaler is easy to sell. Practically every demonstration means a sale—a satisfied customer who becomes a booster and comes back again to buy extra Patch-&-Heat-Units for use with his Shaler Vulcanizer. Every sale is but the first of a chain of sales on which you make a liberal profit. The Shaler is a necessity that does not come with the car but which every motorist needs—sooner or later.

All Jobbers Sell It—Write for Window Display

The Shaler 5 Minute Vulcanizer also repairs rubbers, rubber boots, hot water bottles, rubber gloves, coats, etc.

The Complete Outfit includes the vulcanizer and 12 Patch-&-Heat Units (6 round for punctures and 6 oblong for cuts) and retails for \$1.50—except west of the Rockies and in Canada. Extra Patch-&-Heat Units retail for 75 cents a dozen. Write now—for our new Window Display, Counter Display, Circulars and other Dealers' Sales Helps—Dealers' Discounts, etc.

C. A. SHALER CO., 357 Fourth St., Waupun, Wis.



NEW FACTORY of the
CHAMPION PNEUMATIC MACHINERY CO.
Located at 8164-66-68 S. Chicago Ave., Chicago

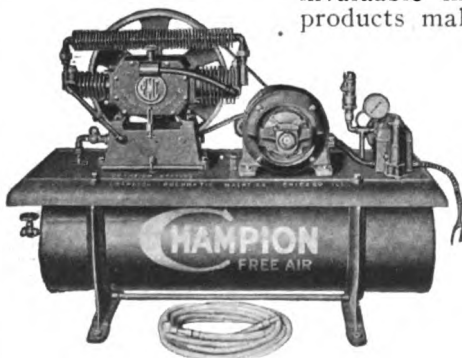


“PROGRESS”

Surely there is no more forceful symbol of the progress of an organization and the popularity of its products than the building which houses it!

Discriminating garagemen and service station owners **everywhere** have long recognized the superior workmanship and the **excellent** results obtained from the performance of Champion Equipment. Their insistant and ever-increasing demands for “more” have made the building of a great new plant, with facilities “looking far into the future,” a necessity.

In this modern plant are manufactured Champion two-stage compressors—efficient and durable—compressors that “never wear out,” air and water stands strikingly handsome in appearance — invaluable in the scope of their service. These products make the name of Champion a byword of quality among garagemen who know.

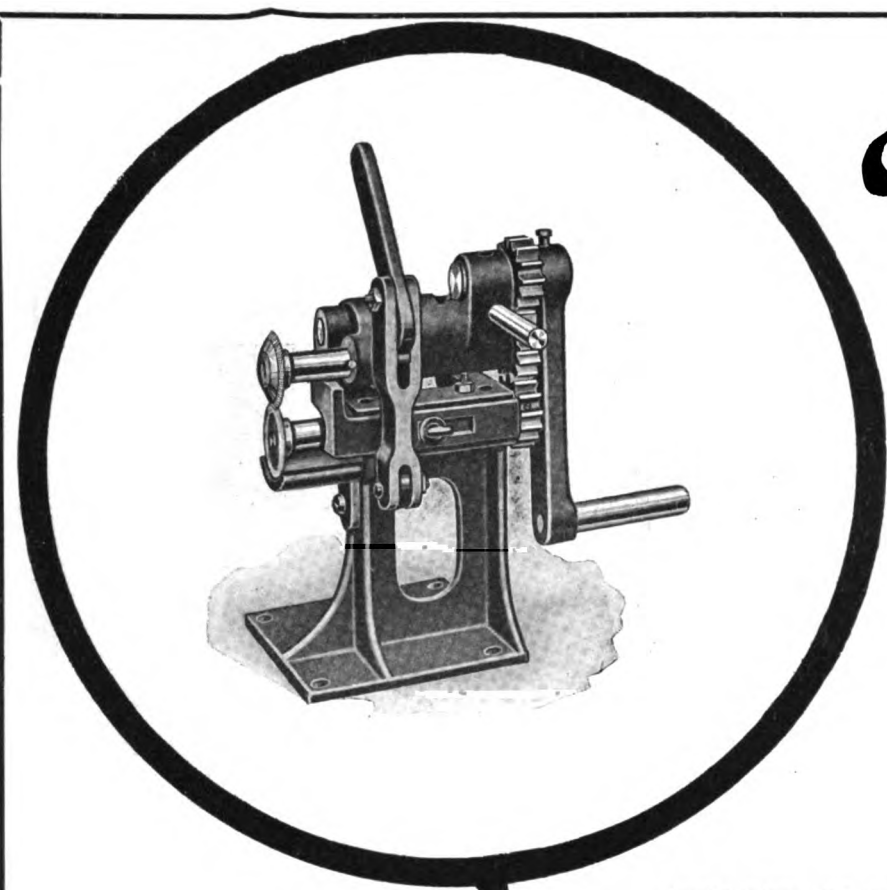


If you would have an establishment whose air service is **incomparable**, let us send you details on Champion Equipment—now.

**Champion Pneumatic Machinery
Company**

8164-66-68 S. Chicago Ave., Chicago





The Story of Patches

**IN
FOUR
INSTALLMENTS**

Part 2

THE BEAD CUTTER

"Say 'howdy,'" said the "go-getter" repairman, pointing to a machine nearby—"my bead cutter. When I make patches—I always **make** 'em now, cheaper and better by far than stiff readymades) after I've removed the tread with the tread puller I showed you the other day, I use the bead cutter. It's a peach!

"Shaves off those beads in a jiffy—clean as a whistle. See, the head is hinged so the tire can be placed between the two circular knives without first cutting the bead by hand. A device feeds the tire along. All I have to do is guide it. The cutter does the rest.

"Only cost \$27.50. Would you be without it? I wouldn't—not for three times that. Bought it with my 'set'—the tread puller, patch trimmer and fabric skiver. And got 'em all for \$121.50—on easy payments. They're the berries, I'll say!"

(To be continued)

THE P. S. M. CO.

3116-36 Snelling Ave., S. Minneapolis, Minn.



What Happens After 4 or 5 Years

Your old Brunner—with a few adjustments—will be better than any new machine you can buy.

ALL Brunner parts are standardized. And they are made with extreme care and skill. They fit exactly—always.

Well-fitted parts wear longer—of course. They run more smoothly and efficiently. They wear *evenly*.

And when they *do* wear down to an extent that makes adjustments advisable—the Brunner *ground* surfaces, perfect alignments due to careful gaging and special jigs and fixtures, the highest grade of special castings carefully selected and admitting of rebuilding to several oversizes—give the Brunner owner at small cost a renewed machine that is as good as new.

No wonder so few second-hand Brunners are obtainable. Their owners will not sell them—at any price much less than the cost of a new machine!

Write us for a free copy of the "Air Compressor Handbook" and know exactly what sort of compressor will best fill your needs.

BRUNNER MFG. COMPANY

Oldest and Largest Manufacturers of Air Compressors in the World

UTICA, NEW YORK

Sales Offices: Utica, Cincinnati, Kansas City, San Francisco and nearly every jobber from Maine to California

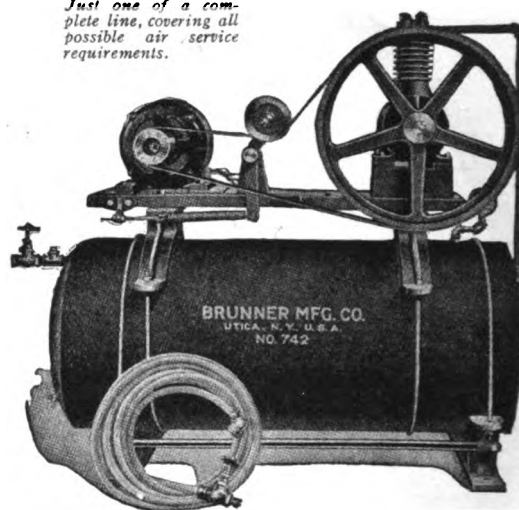
Brunners Are No Higher Priced

Quantity production permits pricing Brunner Quality Compressors at same figures as any ordinary compressor of similar capacity.

Ask for Your Copy of This Book

A very interesting 24-page book on the Principles and Methods of Air Compression will be mailed to you upon request.

Just one of a complete line, covering all possible air service requirements.



Where Every Brunner Excels

1. All running surfaces and bearings *ground*.
2. Evenly *balanced* piston loads.
3. Any model can be rebuilt to *several oversizes*.
4. Easy replacement with *standardized* parts.
5. Valves and fittings *non-corroding* brass.
6. Absence of *vibration, noise, or loose joints*.
7. A Brunner lasts for *twenty* years and more.

BRUNNER

BRUNNER

AIR COMPRESSORS



Comfortable Driving at Zero!

THE KINGSTON CAR HEATER stands between you and the coldest wind that blows. It is a heater that keeps your car warm in zero weather, that warms the car with pure, fresh air, that can be instantly adjusted to meet your wants, that is beautifully and substantially built—an ornament to any car.

Kingston Car Heater

NOTE the New Low Price

DEALERS everywhere should order their stock of KINGSTON HEATERS at once. Last year when cold weather came the demand was so great that some orders were delayed. This year, with greater production, with a finer heater, **and with the new low price**, the sales of Kingston Heaters will break all records.

THE KINGSTON HEATER is not only handsome and well made, but it is easily installed, and complete instructions are packed with each device. Dealers will find it a quick and easy seller, insuring in every case a satisfied customer.

FORD

Model Complete

\$3⁷⁵

**Chevrolet
Overland
Dodge**

\$5⁰⁰



IMPORTANT TO THE DEALER

We are going to give the dealer full co-operation in his individual territory on the sale of the Heater. Order at once, so that we may circularize your trade. The Kingston Heater should be your best selling accessory this Fall and Winter. Write or wire today.

THE KOKOMO ELECTRIC COMPANY
KOKOMO, INDIANA

BRANCHES
NEW YORK, 245 W. 55th St. BOSTON, 15 Jersey St. DETROIT, 4610 Woodward Ave.
CHICAGO, 1430 Michigan Ave. SAN FRANCISCO, 1235 Van Ness Ave.

KINGSTON

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, Editor

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| A. F. McCarty tells, in a most interesting way, of Dealer Brown's experience with a customer whose business generally meant more trouble than it was worth—and shows the application of the law in the case of guarantees. | | Presenting methods which some of our readers have found good and are passing on for the benefit of other shops. | |
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| Current comments and observations by the Editor. | | A department designed for the specific purpose of aiding readers of the American Garage & Auto Dealer with the problems which may arise in their work—whether shop work methods, legal questions, accounting, or organization, etc. | |
| How Fabric Tire Repairs Are Made | 21-22-23 | Accessories—Dealers' Key to Profits | 50-52-54 |
| Another of the series of articles on "Tire Repair and Vulcanizing," by Lowell R. Butcher and H. J. White, giving the rules for repairs of fabric tires, which are practically standard and represent average of methods used in different shops. | | Don't fail to read about the new accessories that are being placed on the market—You will find them described in this department. | |
| How Do You Handle Your Credits? | 24 | Up-to-the-Minute Garage Equipment | 56-58-60 |
| J. N. Bagley offers some good suggestions for the handling of credit accounts and effective methods of dealing with the "slow-pay" customer. | | Shop equipment that will aid in giving good service is described on these pages. | |
| Proper Grinding of Lathe Tools | 25-26-27-28-29-30 | | |
| Gustav H. Radebaugh points out the importance of proper grinding of lathe tools in order to get the best results. | | | |

AMERICAN GARAGE & AUTO DEALER, Inc.

116 South Michigan Avenue, CHICAGO

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THE SATURDAY EVENING POST

Free Service Should Pay

MANY prospective customers stop to read a letter to a dealer and find the very satisfactory. They read with interest, because it is free, and read that the dealer should pay.

Wayne Tank & Pump Company, Fort Wayne, Ind.

Wayne

AIR COMPRESSOR SYSTEMS

Amundgaard Machine Company
Complete Line of International Farm Machinery
Tractors and Trucks
ARGYLE, MINN. June 8, 1922.

Wayne Oil Tank & Pump Co.,
Minneapolis, Minn.

Gentlemen:-

We are interested in obtaining a water and air station for the front of our building and we would like to get circulars and prices on the outfit advertised in the Saturday Evening Post about a week ago. It looked like what we wanted and if it is as good as the five gallon pump and the battery of oil pumps we received from you it is what we are looking for.

Would be pleased to hear regarding this.

Yours very truly,
Amundgaard Machine Co.

Read What This Dealer Says of Wayne Pumps

Mr. I. Amundgaard, Manager of the Amundgaard Machine Company of Argyle, Minnesota, read an advertisement on the Wayne Air Compressor in his Saturday Evening Post. Then he wrote our Minneapolis Office about it. Part of his letter reads:

It looked like what we wanted and if it is as good as the five-gallon pump and the battery of oil pumps we received from you it is what we are looking for.

Naturally, we think that Wayne Pumps are pretty good. We do our best to make them so—to make them render the utmost in service and satisfaction.

Mr. Amundgaard finds that we have succeeded.

Don't you think it would be worth your while to learn more about the good qualities which have made Wayne Pumps so satisfactory to this truck and tractor dealer up in Minnesota?

Let us send you Bulletin 276-AGD which describes the standard five-gallon Wayne Pump shown here. And if you are interested in the Wayne Air-Compressor, ask for Bulletin 2000-AGD also. A postal card request will bring either or both these bulletins. There is no obligation, of course, so far as you are concerned.

Wayne Tank & Pump Co., 774 Canal Street, Fort Wayne, Ind.

Canadian Tank & Pump Co. Ltd., Toronto, Ont.

DIVISION OFFICES IN

| | | | | |
|-------------------|------------------|---------------------|-------------------|--------------|
| Atlanta, Ga. | Boston, Mass. | Chicago, Ill. | Cleveland, O. | Dallas, Tex. |
| Detroit, Mich. | Kansas City, Mo. | Minneapolis, Minn. | New York, N. Y. | |
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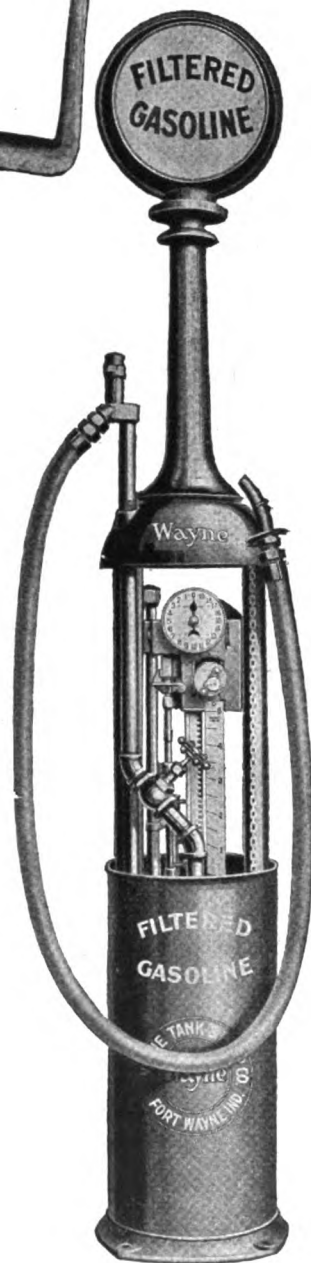
Warehouses in Philadelphia and San Francisco.

An International Organization With Sales and Service Offices Everywhere

Wayne

REG. U. S. TRADE MARK

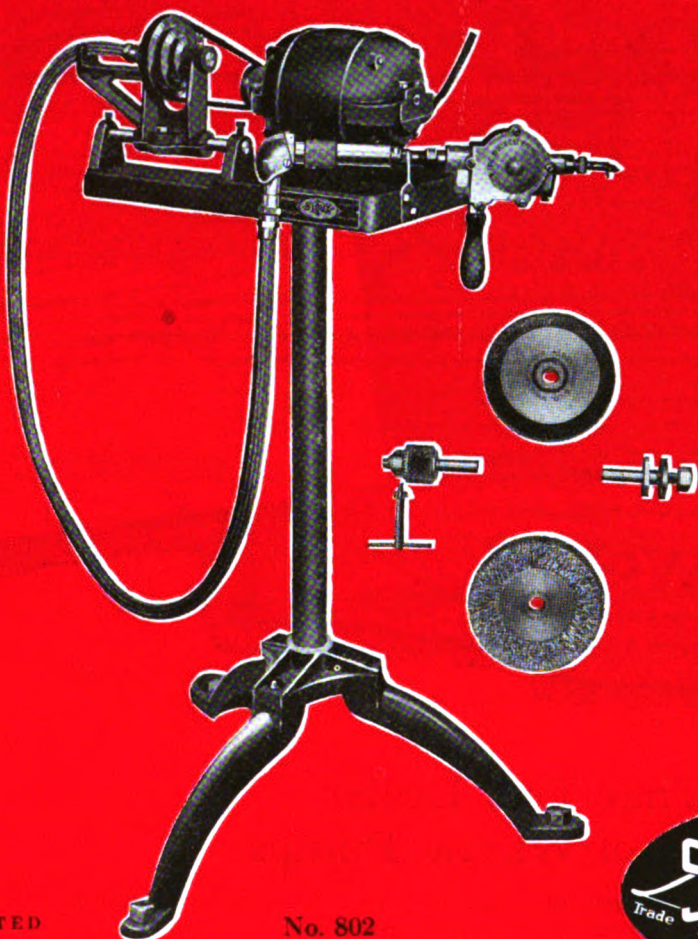
HONEST MEASURE PUMPS



Cut 276
Five-Gallon Pump


| | | | | | |
|------------------------|---|------------------------|---|-------------------------------|--|
| Measuring Pumps | Storage Tanks (From 20 to 20,000 gals.) | Air Compressors | Oil Burning Systems, Furnaces and Forges | Oil Filtration Systems | Wayne Rapid-Rate Water Softening Systems. (Borrowman Patents) |
|------------------------|---|------------------------|---|-------------------------------|--|

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



PATENTED
April 12, 1909
May 21, 1912
Oct. 22, 1918
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No. 802



Takes the Tool to the Work

TRANSMITS the power at point where you want it. Has unlimited uses in every shop. Handy for getting under car or working in cramped quarters. No need to take car apart. Can be driven by an electric drill $\frac{1}{2}$ -inch capacity or more, or direct from line shaft, lathe, drill press, emery-wheel stand, or any power that will drive shaft at a speed of 1,000 to 1,725 r. p. m.

Is especially adapted for Emery Wheel Grinding, Drilling, Reaming, Polishing—for Tire Buffing work in Tire Repair Shops and for Valve Grinding. Has a three-speed pulley and a control that enables you to stop and start at will the tool being used.

Liberal Discount to Dealers

If you are interested in cutting your shop costs, get full particulars on this convenient tool for shop work. Your jobber can supply you with literature, or write us direct and we will send it to you post paid.

Sold by All Live Jobbers

ALBERTSON & CO.
SIOUX CITY · IOWA

SIoux FLEXIBLE SHAFT ATTACHMENT

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

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American Garage & Auto Dealer

*A Business Paper Exclusively for the "Small-Town
Automotive Trade*

Vol. XIII. No. 8.

CHICAGO

AUGUST, 1922

Solving the Used Car Problem

A Week's Trial and 30-Day Absolute Guarantee Found Effective by Oregon Firm—System Builds Confidence Which Frequently Develops Sales of New Cars—Only Eight Makes of Automobiles Accepted and These Are Standard

By Mal Wharton

A week's trial and an absolute guarantee for 30 days have solved the used-car problem with one prosperous automobile firm at Portland, Ore. A few years ago—several less than a decade—the concern of Cook & Gill inaugurated the policy of selling used automobiles with a written guarantee and a seven days' trial.

Since that time, the firm has steadily grown and expanded until now it is housed in one of the finest exclusive automobile and repair structures in the entire far West. A very considerable portion of the progress and achievements of the institution is due directly to the policy employed in the disposal of used cars.

The operation of the used-car department of Cook & Gill is simple. There are no intricate systems to be followed or formulas to be remembered, but results have indelibly shown that the methods inaugurated to sell used automobiles have proved their efficacy beyond the hope of successful contradiction. The attainments are held directly attributable to the 30-day written guarantee and the seven days' trial which go with every used car sold.

The system creates satisfied customers. It builds in the minds of the purchasers or prospects the confidence which is oftentimes lacking under other methods of disposal. The buyer feels assured that the selling concern has confidence in its own wares. This state of mind is transferred to the customer and is reflected in a rapid turnover of the automobiles.

"If the dealer in used cars will take them in at the right price his problem is half solved," is the declaration of Manager Harry W. Lyon, of the used-car department of Cook & Gill. "Too many dealers, in order to sell a new car or to make a trade or deal, go against their own better judgment and



Just a Corner of Cook & Gill's Automobile and Repair Establishment—Said to Be One of Finest in Entire West.

allow a greater value for the car turned in than it is really worth.

"This plan is certain to bring ultimate harm, for the reason that the dealer is scarcely ever enabled to get the purchase price out of the car so bought. Only if the price is such that I am certain that the machine can be readily resold, will I buy it. It is not wisdom to assume a loss on used cars

merely to sell new ones. Seventy-five per cent of the dealers who failed in the automobile business the past year attribute their failures to their inability to get out from under in their used-car business."

The procedure of Cook & Gill, relative to the purchase and resale of used cars, is unpretentious. The person who has an automobile to sell comes in and asks for an appraisal. This is made. Once an agreement is reached between the firm and the seller, the car is taken to the various repair departments and, under the scrutiny of the best mechanics available, is thoroughly placed in order.

The machine is then tagged and put on the salesroom floor. Only eight makes of automobiles are accepted. These are the well-known standard makes that have a determined resale value. No heavy or orphan cars are considered. The reason is that heavy and orphan makes rarely give satisfaction, on account of the difficulty of readily obtaining parts, and repairs are generally high.

Used cars never stand on the Cook & Gill sales floor more than 60 days. From years of experience, Manager Lyon knows that it does not pay to hold any used car for more than two months. That is the reason why the firm is unwilling to buy cars that will not "turnover" quickly on the sales floor.

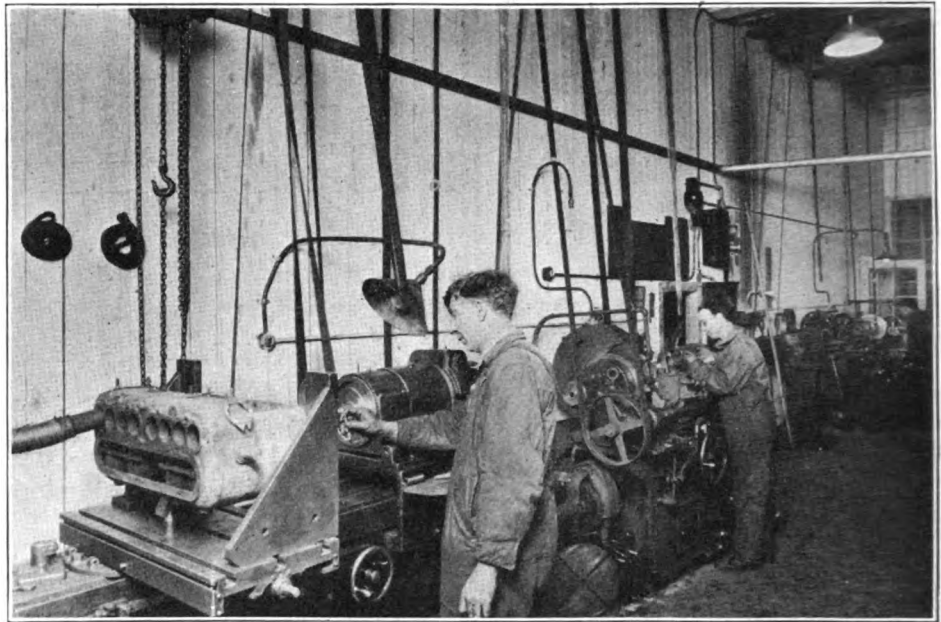
Never is more than \$10,000 invested in used cars on hand at any one time. This rule is iron-clad. The firm considers it unwise to have more than this

amount tied up in used automobiles. The interest alone on \$10,000 is a considerable item. Cook & Gill plan to make the rapid turnover of their re-sell stock assume the interest and overhead expenses of selling and conditioning. In order to sell rapidly, the price to the consumer or customer must be right. The week's trial and 30 days' absolute guarantee are the levers used to start sales.

When the customer determines which car he wants, he is given a written guarantee that the automobile may be exchanged at any time within one week after purchase for any other used car in the plant. This plan, at one stroke, dispels most of the fears of the purchaser. Then the buyer is given a 30 days' contract guarantee which protects him against any mechanical or operating defects whatsoever for 30 days after the purchase date.

This guarantee is an exact duplicate of that given with the sale of new cars, with the exception that it reads for 30 instead of 90 days. This selling system is considered to be a 100 per cent efficiency guarantee for used cars. It is also considered that any weakness in the car sold will show up in 30 days, permitting the owner to have his machine fixed at the expense of the house.

Since the instigation of this selling method, the firm of Cook & Gill has grown to be one of the largest west of the Rocky Mountains. That the guarantee policy and week's trial have been the instruments in building up this clientele is known by the fact that the



Automatic Cylinder Grinding Machines Add to Efficiency of Repair Department of Cook & Gill, Portland, Ore.

customers invariably demand written guarantee contracts. There are no dissatisfied customers under the workings of the plan. The firm considers that a satisfied customer is its most valuable asset and the foundation upon which any selling organization, which hopes to become really big, must be built.

There is another angle of the selling game which the guaranteeing of used automobiles has stimulated for Cook & Gill—and that is the sales of new automobiles. The customer who buys a guaranteed used car has confidence in the firm instilled within him. Most buyers of used cars later become new car owners. It is declared natural that they should seek the firms where

they believe they will be best treated for their new car purchases.

Cook & Gill carry a complete line of one well-advertised, medium-priced car. The firm has found that purchasers of used cars often return to their doors to buy new automobiles. For the reasons of satisfaction and the increased business resulting from the guaranteeing of used cars, this prosperous Pacific coast firm is certain that the system employed by it is the best one, as applied to the purchase and resale of reconditioned automobiles.

Trucks Said to Increase Creamery Business in Iowa.

An average of 3,600 pounds of butter is now being made weekly by the Traer Creamery Co., of Iowa, under its new marketing plan of paying a premium for cream gathered by trucks.

Although the new plan has been in force less than a month, the creamery is receiving four times as much cream as formerly and of much better quality.

Questionnaire Shows South Pasadena Citizens Want Buses.

The returns of a questionnaire sent out to 1,000 citizens of South Pasadena, Cal., indicated a six to one majority in favor of the establishment of a motor bus line between Pasadena and Los Angeles. More than half the population of Los Angeles—312,000 out of the 575,480 residents—use the new Union motor bus depot regularly, the ticket sales amounting to \$700,000 for nine months.



View of the Welding Section of Cook & Gill's Automobile Repair Department.

Merchant Neighbors Can Aid Sales

Many Possibilities for Garageman Who Co-operates with His Neighboring Merchants—One Man Devised a Plan for Co-operation with Local Paint Dealer and Leading Department Store with Mutually Satisfactory Results

By J. K. Novins

Few small town garagemen realize the possibilities in store for them through co-operation with their neighboring merchants. The successful small town storekeeper has succeeded in placing his retailing upon a scientific basis—as witness the fact that there are some merchants in small territories who boast of annual sales running into six and seven figures.

Their success depends chiefly upon the fact that they have devised efficient methods for locating prospects for certain classes of merchandise, and they use sensible methods to interest these prospects to come to their stores.

In brief, these merchants have gotten up well-arranged mailing lists, and they follow their prospects by mail. Where the town is small, they reach residents of surrounding territories, inducing them to come to town to make their purchases in an up-to-date retailing establishment.

Another thing: In some towns the merchants get together and make use of a co-operative mailing list, each merchant swapping names of prospects with other merchants in the same or other territories.

Just how can the automobile dealer in the small town co-operate with these merchants in order to increase his own business and, at the same time, make it worth the while of the merchants to lend their co-operation to him?

In a certain Middle-West city there is a local hardware dealer who has developed a profitable business, mainly because he uses system in attracting prospects for paints and allied products. This dealer keeps a file of prospects for paints, and he follows up these prospects by mail whenever he knows that they contemplate painting their homes.

On each card is set down the following information: Name of prospect, occupation, address, wife's name, children, hired help, size of farm, special information about his various needs. On the card is also set down whether he is a prospect for paint, cooking stove, heating stove, gas range, kitchen cabinet, washing ma-

chine, etc. In the right-hand corner, below, is noted whether his home is of brick, cement and whether it is frame, and just what paints are used on the walls inside.

A local garageman made up his mind to co-operate with this paint dealer. Before approaching him on the subject, he framed his line of talk, which ran about as follows:

"Mr. Smith, you are conducting a profitable paint business. I am conducting a fast-growing garage. I sell a lot of automobile accessories and I sold quite a lot of cars last year, considering the size of my place.

"Now, I have a plan by which you can increase your sales and, at the

A GOOD EXECUTIVE.

A good executive has a certain amount of reserve. He gets other men's ideas—but he doesn't do much talking about his own. The valuable executive is not expansive about his work; at least not with his subordinates. He may be a good mixer, but he doesn't tell all he knows. He is fearless when it comes to action—but he is guarded when it is a matter of talk. He doesn't tell what he is GOING to do. He waits—and does it.—H. S. Firestone.

same time, increase my own business. We can do this and yet not buck each other the least bit.

"You give me a list of your customers who have recently had their houses painted, or those who are now having them painted, or those who intend to paint their homes in the very near future.

"It may be that some of them own cars. In fact, I know that the majority of them have their own cars. I will write letters to them asking whether they would be interested in giving their cars a good painting and overhauling.

"You see, I am working on the theory that the man who is painting his home would be interested to complete the job by putting his car and garage in spick-and-span shape. In other

words, he is in a frame of mind to listen to my proposition.

"How can I co-operate with you? Very simply. I can give you a list of prospects for paint, turning over to you the names of people who own cars in this territory, as far as I know. When John Smith, who keeps his car in my garage, happens to drop a word about having his home painted, I can drop in a word about your store and turn over his name to you for a follow-up letter or a personal visit from your salesman."

The proposition appealed to the paint man, and his co-operation with the garageman has proven a success. They are still keeping at it. They are very careful, of course, not to infringe upon each other's business.

The garage dealer has gotten up a form letter which he sends to prospects furnished him by the paint dealer. The letter runs:

Dear Sir:

From information furnished us by a friend we learn that you are now painting your house. This naturally leads us to believe that you will be interested enough to avail yourself of this opportunity to complete the job by having your automobile painted and overhauled.

When your home is painted, it will look like new. You will take deep pride in it. The new coat of paint will give it new grandeur. It will also be the pride of the neighborhood.

At a little expense and trouble on your part you can put your automobile into shape to harmonize with the new home surroundings. It can also become the pride of the neighborhood. It will cost you little to put the car in perfect running order, and a new coat of paint will make it appear like a new machine.

No doubt you are aware of our excellent service and reasonable terms. We will be glad to send representatives to see you on the matter, or you can drop in with your car when you are in our neighborhood.

Awaiting the opportunity to serve you, we remain,

Yours very sincerely,

THE ARDEN GARAGE COMPANY.

This garageman also co-operates with the leading local department store. He approached the head of the concern with the proposition that he make use of the store's mailing list to

send letters to those of the prospects who own cars.

It happens to be a well-organized, modern retailing establishment, maintaining a card index of customers and prospects, each card informing whether the prospect is a car owner. This point is important to the department store man, as ownership of a car generally indicates the buying capacity of the prospect.

When the department store conducts a sale of sufficient importance to attract a lot of suburbanites, the garageman addresses a letter to the suburban owners of cars, informing them that when they come to town for the sale their cars can be left in this garage and will be overhauled at slight

cost while the car owners are engaged in shopping at the store.

The letter is brief, and is worded:

Dear Madam:

Of course, you are coming to attend the big sale at Thompson's store next Friday. May we suggest to you that you take advantage of our excellent garage facilities?

While you are attending to your shopping, we will give your car an overhauling. We will not only give quick service, but the cost is the most reasonable around these parts. Certainly that will be a convenience to you, and we trust that you will take advantage of the opportunity to put your car into good shape.

Our garage is right on the main road as you get into town.

Yours for service,

THE ARDEN GARAGE COMPANY.

As the department store maintains an up-to-date mailing list, a constant

tab is kept on removals, which are noted on the cards as soon as notices to the effect that removals have taken place are received. The automobile dealer takes advantage of this by sending letters to these people, calling attention to the excellent garage service. He figures that removals are generally accompanied by changes of garages to house cars.

In exchange for the department store's co-operation, the garageman has placed a large sign near his garage, bearing the name of the department store. On this is painted a large arrow guiding motorists to the store. When opportune, he drops a word to tourists and others calling attention to the excellent merchandise which may be bought at the department store.

Real "Go-Getter" Lubrication Service

Motorcycle Service of Philadelphia Firm Carries Same Tools, Appliances and Lubricating Agents as Used in Service Station to Patrons "Anywhere Any Time"—Motorcycles Given "Beats" or Zones of Individual Operation

By K. H. Lansing

There's a new kind of genuine "go-getter" lubrication service for motor cars that has been in operation in Philadelphia just long enough to prove it a success. It's a story of how "Mohammed came to the mountain."

The United Auto Lubricating Co., which has its service station at 717 St. James St., is the concern that is doing this pioneering in that section of the country. The only other service in the entire United States, which is said to have methods somewhat similar, is conducted in Los Angeles.

The Philadelphia company maintains, as its service station, a six-car garage in charge of a manager, assisted by lubrication experts, who make a specialty of work on high-grade cars. The most striking feature of the business is its motorcycle service, whereby the same kind of tools, appliances and lubricating agents as are used in the service station are rushed to patrons "anywhere, any time." Hence, it is more than a mere road service.

The company has three Indian motorcycles with Hendee van side-cars in which are carried the appliances and lubricants. Each patron's car is oiled and greased in every detail, including the draining of the crankcase and attending thoroughly to grease cups, oil cups, transmission, differential, springs,

universal joints, hub cups, steering system, brakes, magneto and fan.

There are three divisions of flat rates—for small cars, medium cars and large cars—the company charging by the size of the wheelbase. Thus, Maxwell, Chevrolet and Ford cars are



Motorcycle Carries Complete Lubrication Service to Motor Cars "Anywhere, Any Time."

served for \$4; Dodge, Overland 4 and Oakland, for \$8; and Packard, Pierce-Arrow, Cadillac cars and the like for \$10.

Servicing in these cases, of course, means thorough lubrication only, as the service station is not a repairshop

in any sense. The company, however, has in its employ an expert motorcycle mechanic to see to the machines it uses in its service work. The motorcycles operate within a radius of about 20 miles from the service station and, except in emergency calls, have "beats" or zones of individual operation.

For instance, one motorcycle will cover what is known as the "Main Line," or the places scattered along the Pennsylvania railroad right-of-way. Another will cover the north end of the city, and the third will have as its territory both the south and southwestern portions of the city. Rarely do any of the company's motorcycles average more than 50 miles a day. The van body side-cars are painted red to match the motorcycle and have on them the company's advertisement in yellow lettering.

The garage and office together occupy about 40 square feet. There is curb oil and gasoline service and the company is agent for Gargoyle Mobil-oils and greases, Atlantic gasoline, oil gages for Ford cars and a line of automobile accessories.

While only a very small stock of the accessories is on hand, the company is able to supply any desired automo-

(Concluded on page 17.)


Records For the Small Service Station

This Article Completes Description of Records Suggested For Use in Small Service Stations, Part of Which Were Given in Article Published Last Month—A Practical Set of Shop Records Is Afforded by These Forms


By K. H. Lansing

When the workman starts on the job, time must be noted in the space opposite the word "On" on the back of the repair order, and his number and the item of the order on which he is working must be recorded in the proper column. When the workman leaves off work, or finishes his job, his time must be noted in the space opposite the word "Off" and the number of hours may be reckoned and filled in, in the "Hours" column. By using the rate of pay, the labor cost of the work may be reckoned.

Requisition information—either charge or credit—must be filled in in the respective columns under "requisition summary," except the price, which must be left open till the requisition has been filled and priced by the stockkeeper, or until the requisition has been through routine of an equivalent nature. Then original requisition forms

| Priced by <i>G.P.</i> | |  | | REQUISITION COPY | | No. 3155 | |
|--|----------|---|-----------------|--|------------|---------------------|--|
| Original and Copy to be turned in for parts supplied. Copy held by stock room for checking stock. | | | | Charge to R. O. 105 | | Date 7/18 19 | |
| Quantity | Part No. | NAME | | Cost | Sale Price | | |
| 1 | 1 | 60198 | Gas Tank Gasket | 04 | 05 | | |
| 12 | 12 | 48280 | Clutch Liners | 4 60 | 6 00 | | |
| 100 | 100 | 56862 | Rivets | 16 | 20 | | |
| 1 | 1 | 74390 | Speedom. Shaft | 6 00 | 8 50 | | |
| | | | | TOTAL | | | |
| Factory Order No. <input checked="" type="checkbox"/> | | Date Ordered <input checked="" type="checkbox"/> 19 | | Date Received <input checked="" type="checkbox"/> 19 | | | |
| Order made out by <i>D.J.M.</i> | | O. K'd <i>M.P.D.</i> Foreman | | Received by <i>Riley</i> | | Checked by | |

The Parts Requisition Form is Self-Explanatory.

| Date <u>10</u> | | ORIGINAL | | REQUISITION FOR CREDIT | | | | No. 3697 | |
|--|-----------|---|---------------------|-------------------------------|---------------|-------------|--------------|-----------------|--|
| Shipper or Order No. | |  | | Customer's Name | | | | R. O. No. | |
| Address | | | | | | | | | |
| Model | Motor No. | Date Original Delivery | Date of Replacement | Mileage | Returned by | Received by | Priced by | | |
| | | | | | | | | | |
| Item | Quantity | Part Number | NAME | | Claim Tag No. | List Each | List Total | Total Cost | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| REASON FOR RETURNING—(Give full detail using reverse if necessary) | | | | | | | | | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| CREDIT REPAIR ORDER NOW | | | | BASIS OF CREDIT | | | AMOUNT | | |
| CREDIT CUSTOMER'S ACCOUNT NOW | | | | | | | | | |
| CREDIT CUSTOMER ON FACTORY O. K. | | | | | | | | | |
| Check Opposite Credit Disposition | | | | | | | | | |
| THIS COPY FOR ACCOUNTING DEPARTMENT RECORDS. | | | | O. K'd by | | | TOTAL CREDIT | | |

Requisition for Credit Form to Be Used Whenever Material is Returned to Stockroom.

The repair order envelope is a general container of all papers on each repair order. In the shop office, completed time slips and requisitions are inserted and, when completed, the shop office copy and any other papers are

[illegible]

Each day the timekeeper puts down across the top of the page the number of each repair order in the space to the right of the words, "R. O. No." In the space to the left he enters the time of "in" and "out" and the "total amount of time" according to the time slips is totaled and filled out on the

The repair order recapitulation sheet form also serves two purposes: First, it is a record of departures and, second, it is a handy recapitulation—for the benefit of the service manager—of the most vital information contained on the repair order form. It is made out

[illegible]

(Concluded on page 18.)

The Law, The Facts and the Garage

All Dealers Have Among Their Customers Some Whose Business Means Almost More Difficulties Than it Is Worth—The Dealer in This Article Learns Through One Such Customer the Application of the Law to Guarantees

By A. F. McCarty

As has nearly every retail business, the Brown Garage & Auto Supply Co. had among its many steady customers one whose habits were not an unmixed blessing. Nearly every purchase made by Bert Caldwell entailed an unusual amount of grief.

Bert considered he knew about all there was to know about everything kept in such an establishment—metals, rubber, fabrics, or any other materials, as well as the processes of manufacture and the adaptability of substitute devices and substances, were to him as an open page. With all his assumed knowledge, he had a disagreeable way of hanging a statement of the dealer onto nearly every purchase, making it the basis later for fault-finding or an utterly unreasonable return of the article.

"Got a good pair of tire chains?" asked Bert, as he entered the store one morning. "Goin' to be out on the road for a spell now and I want to be ready for mud."

"Sure we've got a good pair of chains, Bert," said Nelson, the salesman, laying out a well-known make. "That about what you want?"

"32 by 4, are they?" Bert asked.

"Those are a size larger, but we have the size you want."

Bert picked up one of the chains, carried it to the light, blew his breath on the metal, "hefted" it, and finally took out a pocket knife and tried its edge on a link.

"Warrant 'em to wear?" he asked.

"For how long?" asked Nelson.

"Why, 's long's a good pair of chains ought to," said Bert.

"Seems to me that'd be a matter of opinion," said Nelson, "depending upon what kind of use and wear they had, too."

"Well, I was thinkin' o' puttin' 'em in the tool box except when the roads are muddy, then I'd put 'em on the car wheels. Didn't have any idea, y'understand, o' usin' 'em for log chains."

Nelson joined Bert in the laugh at his own sally.

"Look here, Bert, you're a pretty good judge of a piece of chain, aren't you?"

"Sure am, when I'm usin' it."

"Well, that's the best brand of chain. It's well made, of good material, and has given satisfaction, generally. We've never had a complaint on those chains."

With that Caldwell paid for the chains and left the garage with his purchase. When an opportunity presented itself, later in the day, Nelson reported to his employer the conversation he had had with the cantankerous customer.

"That reminds me," said Elwood Brown, proprietor of the business, "Since Lawrence cleared me up on those other legal matters I've paid a little more attention to such things. There's no need for a dealer to continually get the hot end of these little deals. Lawrence is to be home tomorrow for a little visit and I'll just put this matter of warranties up to him."

The proprietor's young son—who was attending the law school at the state university—had the law on the subject fresh in his mind, and at the end of his father's recital of what had been said between Bert Caldwell and Nelson, he laid down some rules for the guidance of the business:

"You have already learned never to guarantee anything as 'satisfactory,'" he began. "It is, perhaps, of equal importance that you learn just what warranties are and what effect they have on the aftermath of a sale. What is said at the time a sale is made is part of the contract of purchase and sale, if it is said before the deal is closed and the customer relies upon it."

"If it amounts to an express warranty, and the article turns out to be a different thing, or of different quality from what it was said to be, the customer can rescind the sale and recover his money, of course. But before there can be an express warranty, there must be words said relative to

quality amounting to statements of fact—not mere conjecture or opinion, though it is not necessary that the word 'warrant' be used. A flat statement of quality, made to induce the sale, is interpreted by the law as a warranty of that quality described."

"How about Caldwell's chains?" asked Brown. "Would you say that Nelson warranted them?"

"No, he didn't, if you have quoted him correctly. What he said was but an expression of opinion—that is, except as to absence of complaints. That was statement of fact and, if untrue and the chains turned out badly, Caldwell could probably rescind on that ground. As a general rule, there can be no warranty, either express or implied, against plainly visible defects which the buyer has a chance to see, for then the doctrine of 'caveat emptor'—let the buyer beware—applies."

"Of course, as a matter of good business, it is advisable, I presume, to satisfy all customers whom it is possible to satisfy, and no merchant, probably, would object to a return of goods by such reasonable persons. In all cases it is well to guard your statements carefully, especially with those who have the 'return' habit, for the rules of justice as well as those of good business seem to me to say that the activities of the habitual complainer and returner should be curbed."

"If Bert Caldwell imagines he finds something wrong with his purchase, make him keep the goods unless he can actually show you a defect. These fellows can be curbed if the salesman says what he says as what he thinks rather than what he knows, for expressions of opinion are not warranties. The dealer is particularly fortunate if the burden of judgment can be thrown upon the customer, as Nelson came near doing with Caldwell."

"Finally, if a warrant must be given, never use the word 'perfect' nor other superlative term. Confine the language to 'good quality,' or 'well made,' which are comparative words, or say

(Concluded on Page 18)

PENLINGS FROM THE PEN OF DIKE.

All the leading department stores are showing furs in their windows this month. Mr. Dealer! Why not show a few automobile robes in your windows—they will attract attention?

* * * *

Politicians are as thick as flies in most parts of the country. Now they all believe in advertising—if you, Mr. Dealer, would put on an advertising campaign as strong as does a candidate running for sheriff, you would get more sales than most candidates get votes. Try it.

* * * *

Dike spent the last two weeks in Akron, Ohio, the center of the tire industry. Say, things are humming over there. Met a dandy fine bunch of fellows—the kind that's glad to see you. See Akron first—you will be a better tire dealer; they will be glad to see you and you will be glad to know them.

* * * *

No wonder some fellows go broke over in Illinois. In a town there I noticed this sign:

Stoves Way Down
\$65 Stov Pris \$45
Eight Persent of Fer Kash

* * * *

Some dealers sit an' whittle an' cuss the livelong day.
That business it's "jist rotten, it's gotten worse," they say.

Yes, the guy that sits and whittles an' never stops to think,
His business always will be "rotten," 'cause he doesn't use printers' ink.

* * * *

Saw a sign in a dealer's store the other day, which read: "We stay open from 6 A. M. until 12 P. M. in order to serve you better."

* * * *

Fall will soon be with us, but no more can we quote that beautiful poem:

The melancholy days have come,
The saddest of the year,
When it's a little too hot for whisky straight
And a little too cool for beer.

Why not this one?

Summer, it is slowly dying,
Fall is hovering near.
Let's do lots of advertising
For winter will soon be here.

Now is the time of county fairs and pumpkin shows. Harvest is over, and the folks want to go to picnics and fairs. Mr. Dealer, go yourself! Take a new car. You will not only sell some, not only get lots of new prospects and make lots of new friends, but it will do you good. It will also show the folks that you are interested in the community as well as in the car you sell.

* * * *

The flapper is still with us. Some folks think she's cute, some think her awful, and some think she's a fool. But all the same, she attracts attention. Everyone gives her the "up and down." She's an original idea.

Same way, Mr. Merchant, have original ideas in advertising. Folks like to read original advertising. Everyone notices original advertising—it attracts people because it's different. People are tired of looking at the same ads they read years ago—they want a change.

Anyone would rather look at a flapper than at an old maid—anyone will notice an original ad quicker than a stereotyped one.

The Literary Digest had us vote on wines and beer, you know. We thought that issue settled years and years ago. But folks change their minds and habits now, most every day. So you have to be a constant advertiser if in business you would stay.

If your wife didn't keep her house clean every day, you would say she was trifling. How about your store—folks judge your store the same as you judge your home.

* * * *

Clean show windows, neatly dressed, attract attention—dirty show windows attract only flies and more dirt.

REAL "GO GETTER" LUBRICATION SERVICE.

(Concluded from page 12.)

tive equipment quickly, having an arrangement with jobbers. Portable oil pumps are displayed outside the building and on the inside is a row of Gargoyle barrels—each having a neat

Mr. Motorist:

When did you last drain your crankcase, oil and grease your car? If it has been a long time ago you are probably wondering to yourself now:

1. Why is it so hard for me to start my motor?

2. Why am I having so much trouble with my starter?

3. What is the matter with the battery?

4. Why does the car squeak and rattle?

5. What makes that grinding noise in the transmission and differential?

6. Why is it that my springs are rusty and squeak?

7. Why is it that my car does not run smoothly and quietly like most cars do?

8. Why are my arms so tired after only a few hours of driving?

Now is the time when your car should change to a lighter grade oil in the crankcase and be oiled and greased in every detail.

Allow us to do this dirty job for you and start you off right for your winter running.

We will drain off your old oil and put in a fresh supply of the correct grade of Gargoyle Mobiloils as specified for your car by the Vacuum Oil Company's Chart of Recommendations. Wash and fill all your grease and oil cups.

Drain and flush your transmission, differential and universal joints, with kerosene and refill with the best grade of Lubricants. Wash and lubricate your springs and lubricate and inspect every part where such is needed.

We have many satisfied customers, ask your friends about us.

Yours very truly,
United Auto Lubricating Co.

"Follow Up" Prospects With Good Sales Letters.

wooden drip box beneath the spigot. On the wall near the door is a display case of lubricants.

As in the case of other well-ordered service stations, this one issues "follow-up" letters and reminders to customers and prospects from time to time. A sample issued during the winter is illustrated. It makes many valuable suggestions to the car owner who wishes his vehicle to run smoothly and forestall various troubles by being thoroughly lubricated. The letterhead bore the slogan, "Have Us Lubricate Your Car." The letter was signed by H. W. Furlong, manager of the United Auto Lubricating Co.

(Concluded from page 15.)

For each one of the standard operations an operation record card is held in a card file by operation number, and a maximum estimate price is set for making of such estimates if the inspector wishes to set a price for any individual case and include it as a gen-

Some three weeks later, after a spell of bottomless roads, Bert Caldwell entered the Brown garage one morning, carrying one of the chains. Nelson braced himself for the job of meeting Bert's complaint which he saw as plainly as he saw Bert. That person, however, was grinning, broadly.

Owner's Record Cards Are Filed Alphabetically by Owner's Name.

It is expected that the plant will be ready for occupation by April 1, 1923, and that the number of employees, which at present is about 350, will be almost tripled, enabling the factory to augment the daily output of 63 cars and to supply the increasing demands from the territory covered, which includes not only Scandinavia but also Finland, Germany, Poland, the Ukraine, and the Russian Baltic states.

Reverse Side Owner's Record Card.

The method of using the card as a record of operations actually performed is shown in the illustration, near the top of the card. Item No. 6 of the sample repair order has been taken and the information con-

Daily Vehicle Register Form Is Used for Two Separate Purposes



Current Comments and Observations

By The Editor

The Price Reductions.

Those who have been studying the motor manufacturing situation for months past were not surprised when the price reductions on a number of cars were announced the early part of this month.

The keen competition predicted the early part of the year resulted in the sale of a great number of cars—and the factories delivered a tremendous production.

The cost of a car, of course, is dependent upon raw material costs and heavy production. These conditions have been such as to reduce the overhead and result in lower manufacturing costs—and the public is now to receive the benefit.

It is not anticipated that the price cuts will have an adverse effect upon the sales of cars as none of them is sensational.

* * * *

Keep the Car Sold.

"I liked the — car, but their service station has a bad reputation, so I bought this one as other owners spoke well of the service given them."

That was what was given by a motorist as the deciding factor in his selection of a new car.

Another new owner of a well known car—a prominent business man and a candidate for mayor at the last city election—when asked his opinion of it by a prospective car owner replied:

"It's a good car but I do not know as I want to recommend it to you."

Then he told of his experience with it—how he had been requested by the dealer when he purchased it, to bring it in for inspection after running it about 500 miles. He did—and was very much surprised to have a considerable charge assessed to him beyond what he deemed reasonable for changing the oil in the transmission.

But that was not all—the car leaked oil and he found that it was due to a defect which should have been discovered in the inspection by the dealer's service department. So in that particular city that car is receiving a bad reputation due entirely to the carelessness of the dealer's service department.

More and more motorists, when considering purchasing a new car, are giving serious consideration to the reputation of the local service station and the facilities for taking care of the car.

It's not the selling of the car that counts—it's keeping the owner "sold" on his car that is the important thing.

* * * *

Policy Makes History.

Economists tell us that industry faces the problem of doing business for the next 25 or 30 years on a falling instead of rising market and all evidence indicates that the prediction is well founded. But a descending market, it is pointed out, does not mean hard times.

Business, however, must be adapted to the conditions which the new basis develops. As never before men will have to know their business and all its details, for mistakes will count much more than in the past. Keen foresight, knowledge of the business and of people will enable men to do a profitable business.

The policy of a business institution makes its history—and its history proves its policy. This is just as true of motor-car manufacturers and garagemen as of Marshall Field or Wanamaker.

In the planning for "Selling Today," consideration must be given to the planning for tomorrow. It won't do to obtain work that will keep you and your men busy for the next month. It is necessary that plans be made for the business of the month after next—and the next after that—for "tomorrow" will soon be "today."

So an institution's history is a big factor in handling today's business—and it determines the policy of tomorrow.

* * * *

Automobiles and Individualism.

For practically a week the city of Chicago was without street car and elevated railroad transportation. The steam railroads increased their suburban train facilities and handled vast crowds of the city's workers—but it was upon the automobile and motor that the city depended for its real emergency transportation.

The Chicago Tribune in commenting editorially upon the strike, declared that "the automobile has increased the ability of people to take care of themselves—it is a distinct promoter of individualism.

"America's streets and roads are filled with motor cars because the American in his own car feels the independence of going where he pleases and when he pleases. A street car strike does not leave him flat. He can avoid the worst consequences of a suspension of this public utility.

"Motor trucks have restored to him some of the independence of the small community of other years, when it could live on the produce brought in by wagon from the immediate neighborhood. Within limitations his food can be transported in case railway service is discontinued. Chicago can be supported by truck transport."

During the week of the Chicago strike, automobiles and motor trucks performed a notable service and while the city's activities were confined to a necessary minimum, the motor vehicles increased the ability of Chicago people to take care of themselves.

* * * *

Strikes and Business Recovery.

Despite the railroad and coal strikes, there is prevalent throughout the country a feeling that the coming of fall will bring a distinctly brisker business all along the line. The strikes have unquestionably retarded business development, but fundamental conditions are sound and with the strikes settled—as they soon must be—everything indicates another broad general upswing of general business.

The banking condition continues to improve, commodity prices are rising steadily and a bumper production of the nation's crops is forecasted. Nearly all of our major industries are on the upgrade.

These briefly are the factors making for optimism among business men generally.

Of course, there are possibilities of grave dangers that might arise out of the present labor situation but it is unlikely that the worst will happen, so the prospects are for an era of bigger and better business in the next few months.

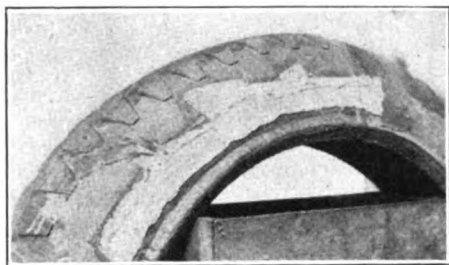
How Fabric Tire Repairs Are Made

Rules Given in This Article Practically Standard and Represent Average of Methods Used in Different Shops—Three Principal Repairs on Fabric Tires Are: Complete Section, Three-Quarter Section and Side Section

By H. J. White and Lowell R. Butcher

Instructors in Automobile Trade School, Des Moines University.

In every tire repair, the work divides itself into two operations—cutting down and building-up. Unless the work of each operation is done carefully, the repair may be a failure. Naturally, the first operation of the repair is the cutting down. Prac-



Complete Section Built Up Ready for Cure.

tice may vary slightly but the rules of procedure given are practically standard, and will represent a fair average of methods used in different shops.

Three of the principal repairs needed on fabric tires are the complete section, the three-quarter section and the side section. Much of the success of the repair will depend upon the diagnosis of the injury and the repair decided upon. A great deal of this knowledge comes with practice but in some cases the repair needed is apparent.

The complete section is necessary when the injury covers so large an area that sufficient purchase cannot be obtained in rebuilding, without extending the fabric across the tire from the toe of the bead on one side to the toe of the bead on the opposite side and across the inside of the casing.

The side section is used to repair rim cuts and injuries at one side of the tire. It is used in preference to the three-quarter and complete sections when the injury is small, being much less expensive and fully as good for certain types of injuries.

Practically all cases of blowouts between the channel of the bead and the tread line on small tires are repaired with the three-quarter section. Many injuries may be repaired with either the three-quarter section or the complete section and the repairman must use good judgment in deciding which to use. The three-quarter section is slightly less expensive but most tires of the larger sizes are repaired with the complete section.

As the complete section is, perhaps, the most difficult of the three repairs and the other two are merely modifications of it, this type will be described first.

The injury is located and probed to de-

termine the extent of the damage. Place the tire on a last, with the damaged spot uppermost. Mark the splice point, referring to the table for distance from the injury, and cut straight across the tire at the highest point of the tread line with a tread knife, beveling the cut at an angle of 45 degrees. This cut extends from tread line to tread line, through the breaker and cushion down to the carcass.

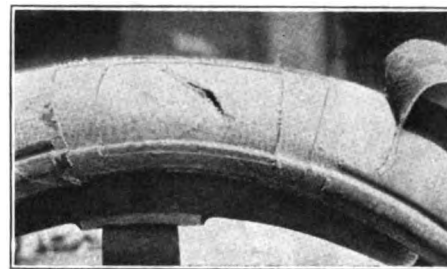
Step each sidewall over $\frac{1}{2}$ inch toward the injury and turn back the tread and sidewalls in three strips, dividing at the tread line. Naturally if one or both of the sidewalls is injured badly, it will be removed entirely. The tread and sidewalls are loosened by the same method as is followed in tearing down a tire for inner boots, except that more care is used that they be not damaged in the process.

The lay back should be one inch farther back from the injury than the splice end and the sidewalls stepped in the same manner. The bead cover is removed by bending it at the splice end, loosening and turning it back the same distance as the sidewall. If in good condition, the bead cover is retained and built back in at the proper time.

The outer ply of fabric is blocked out and removed, cutting across the tire $1\frac{1}{2}$ inches from the splice end and one inch from the lay back. This ply is removed from toe to toe of the bead. The second layer of the carcass is stepped in an inch at either end from the cuts made for the

first removal, and removed from toe to toe of the bead if bead construction allows.

So far, the cutting down is the same, no matter what size tire is being repaired. The width of the remaining plies blocked out will vary with the size of tire being



A $\frac{3}{4}$ -Section Cut Down for Repair.

repaired and the type of bead construction. In general, remove as many plies as possible from the bead without exposing the bead core. Remaining plies are blocked out in 1-inch stepdowns until only two or three plies remain.

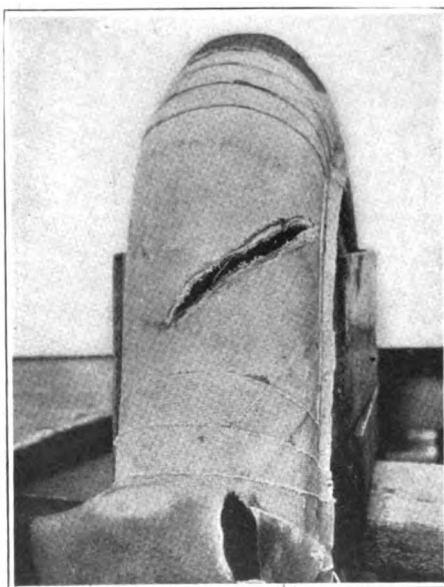
If the damage is not a serious one, three plies may be left. The last ply off should be approximately $1\frac{1}{2}$ inches, on every side, from the damaged spot. All edges of blocked down fabric should be skived or beveled to a feather edge. Skive the edges of the hole to remove all damaged fabric and prevent a hinge joint.

Buff the repair inside and out, taking care that all parts about the injury are thoroughly cleansed and roughened. Remove all loose dirt and soapstone from the inside of the tire and wash the repair with high test gasoline. The tire is now ready to be built up.

Prepare the boot that is to be used for the inside reinforcement. Cement the boot, and both inside and outside of the repair, with three coats of vulcanizing cement. The first coat of the cement should be applied rather thin, to allow for good penetration.

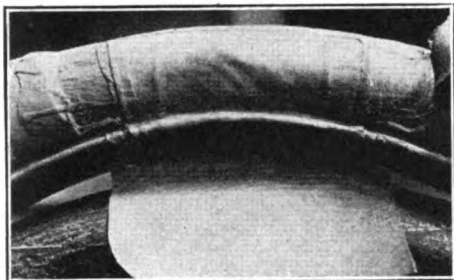
Allow the parts to dry for 30 minutes and apply the second coat, which is thicker, giving a base to the repair. Allow this coat to dry 30 additional minutes and apply a third coat of the same consistency as the second. Building up may be commenced as soon as the third coat has become tacky to the touch. Thirty minutes is usually sufficient time to allow between applications of the cement but, in any case, the cement should have time to dry thoroughly.

Strap the tire to a clean building mandrel, the point of repair being uppermost. Fill the hole with cushion stock and cover



Illustrating the Method of Cutting Down a Complete Section.

the outside of the exposed fabric with strips of cushion stock, allowing the strips to lap each other 1/16-inch. Stitch, perforate and roll to insure good contact at all points. Wash off the repair with a



Showing $\frac{3}{4}$ -Section Partly Built Up.

high test solvent to remove any dirt or grease.

The first layer of fabric is now cut. This is of a size to lap the last block-out 1/16-inch on all edges. Fold the fabric back along the center line of its longest dimension, keeping the coated side out. Apply to the center of the last block-out, working down on either side from the center and stitching at the same time. Application in this way insures good contact at all points. Make sure that the new fabric follows the line of the block-out and laps equally on all edges.

One ply of new fabric is used for every ply removed in the cutting down. Each of these should lap 1/16-inch over all edges of the corresponding block-out, except that plies which go over the head are not lapped at that point. These are cut to fit in the blocked-out space. Otherwise a bulky bead might result. No cement is used between the cushion stock and fabric or between plies of the fabric.

After the last ply is on, which should be left wide enough to pass around the

beads and meet on the inside of the tire, the entire repair is covered with 1/16-inch cushion stock, stitched down, perforated and washed with gasoline. If the bead cover was retained, it is now replaced. However, a great many repairmen omit the bead cover and simply cover the bead with a layer of cushion stock at the splice ends of the fabric.

Fill in the damaged spot on the tread with cushion stock and turn back the tread and sidewalls, pulling and rolling to make good contact. Place a layer of cushion stock on the line of separation between the tread and sidewall, lapping over slightly on each. Fill in with tread gum, making the center slightly higher than the surrounding old gum.

A narrow strip of cushion stock is applied to the lower edge of the sidewall, binding the repair at that place. The splice end is treated in a manner similar to that used for the line of separation. The top of the hole in the tread is first covered with cushion stock and then filled in with tread stock. Tread and sidewall gums should be of the same color as those in the tire.

If the sidewalls were removed when the tire was cut down, it will be necessary to build these up. Two strips of sidewall, corresponding in size to the strips removed, are cut. These will lap under the tread $\frac{1}{2}$ -inch and extend to within $\frac{1}{4}$ -inch of the bead channel. Lap the splice ends over onto the old sidewalls. The edges of the new gum that extend under the tread should be beveled to make a smooth joint. Lap the tread and sidewall with a strip of cushion stock and fill in the depression with sidewall gum, stitching, perforating and rolling all new gum.

The tire is now removed from the building mandrel and placed on a convenient

hangar. The last ply of fabric was cut wide enough to extend around the toe of either bead and meet at a point on the inside of the tire. This point of meeting must not be on the damaged spot but at one side. Place a small pad of cushion stock in the hole of the carcass and fill with a small block of fabric skived to fit. A layer of cushion stock is placed on the inside and the last ply of fabric stitched and rolled into place.

The inside boot is now stripped with cushion stock and applied to the inside of

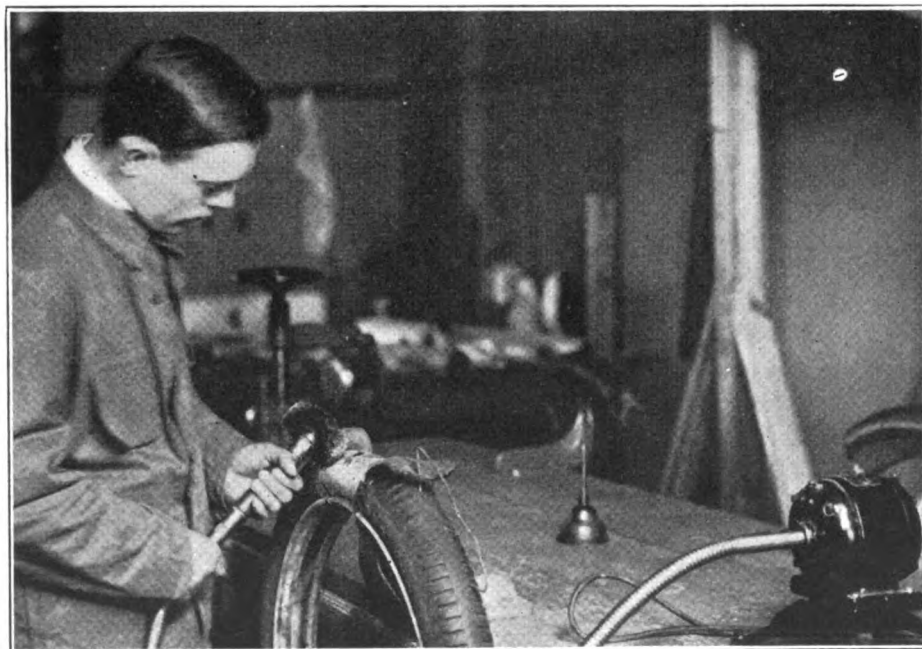
1. Have your tools sharp.
2. Inspect the casing to be repaired and decide on the kind of repair to be made.
3. Have the tire thoroughly dried.
4. Remove all dirt and dead fabric. Material of this sort will cause friction.
5. Aim to remove or step down all but two, or in some cases three, plies of fabric.
6. Step down all overlapped fabric or skive to a feather edge.
7. Skive around the hole when two or more plies are left.
8. Round all breaks at the ends to stop further breaking.
9. Cut tread splices at a 45-degree angle for good connection.
10. Try to carry all cuts to the toe of the bead, except the last ply which stops at the heel.
11. Cut all splices of a non-skid tire at the highest point of tread for the exact pressure in the mold.
12. When tread lay backs are badly injured or worn, cut off and build up from new material or use a similar tread from another casing.
13. Sectional repairs that do not hold are generally due to not stepping the fabric back far enough from injury.
14. Always make a single lay back if the injury does not extend clear across the tire.

General Rules for Cutting Down Which Will Be Helpful.

the tire, starting at the toe of one bead and working across the other. Lap either end of the boot with a strip of cushion stock and smooth the inside repair by rolling.

Trim all new gum on the outside of the tire, keeping the centers slightly higher than the surface of the tire and the edges slightly lower. This will allow the new gum to flow evenly in the curing. Wash the tire thoroughly with high test solvent and allow to dry before curing.

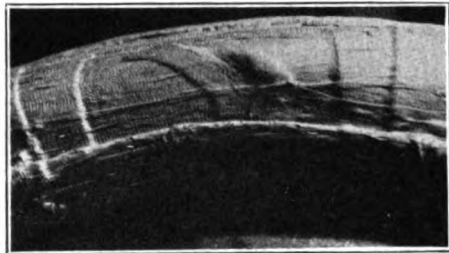
Cure is accomplished in the sectional



How the Buffing for a Complete Section Is Done.

mold, the time of cure depending upon the size of tire and the gums used. The tables on curing should be referred to for time and pressure.

Cutting down for the three-quarter lay back is the same as for a complete section,



A $\frac{3}{4}$ -Section Ready to Turn Back. Tread and Sidewalls.

except that one sidewall is not turned back. Start the blocking down by removing a ply as in the complete section, starting one inch from the sidewall that was left. The remaining plies are blocked out as before, stepping one inch from the preceding cut on the sidewall side each time.

Building-up is accomplished much the same as in the complete section repair. In this case, however, the ply of fabric that goes inside of the tire will extend in from one side only and should lap the damaged spot $2\frac{1}{2}$ inches, taking care that it does not end at the center of the tire.

Cure is made in the sectional mold, the time being slightly less than that required for a complete section due to the fact that there is less new material to cure.

In measuring for a side section, the cut is made $1\frac{1}{2}$ to 2 inches beyond the damage. Cut along the tread line and lay back

1. Always buff the tire thoroughly, taking away all dirt, soap-stone or dead fabric.

2. Rough all splices and parts on which the new gum will be placed with a rasp. Buff rough cords until they shine.

3. If the buffer does not reach all of the parts, use a scraper or knife, softening the material with gasolene.

4. Buff the inside of the tire three inches longer than the repair will be.

5. Buff off all of the old breaker strip from the lay back. If left it may cause a separation in the repair.

6. When buffing, do not press the casing against the wheel too hard. Buffing is done faster if the pressure is steady and even. Too much pressure is apt to burn the tire.

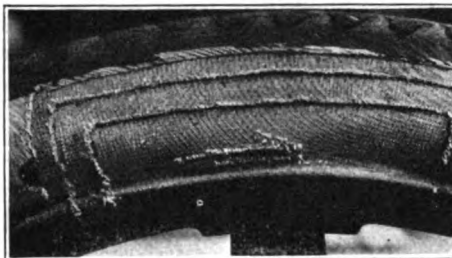
Buffing Rules That Will Aid in Making Tire Repairs.

| Tire Size, in Ins. | Kind. | No. of Plies. | Outside Repair. | | Inside Repair. | |
|-----------------------|---------|---------------|-------------------------|-----------------------------------|-------------------------|------------------------------------|
| | | | Remove No. of Plies. | Measure for Splice, in Ins. | Remove No. of Plies. | Measure for 1st Cut, in Ins. |
| 3 | Regular | 3-4 | 2 | 4 | 2 | 4 |
| $3\frac{1}{2}$ | Regular | 3-4 | 2 | 4 | 2 | 4 |
| 4 | Regular | 5-6 | 2 | 4 | 2 | 4 |
| $4\frac{1}{2}$ | Regular | 6 | 5 | 6 | 3 | 5 |
| 5 | Regular | 6-7 | 4 | 7 | 4 | 6 |
| $5\frac{1}{2}$ | Regular | 7 | 5 | 7 | 4 | 7 |

Scale of Plies to Be Removed in Repairing Fabric Tires.

the sidewall so that it clears the damage the same distance. The bead cover may now be removed. One or two plies of fabric are generally removed in a side section, although this will vary somewhat with the size of tire.

The first ply is cut out $\frac{1}{2}$ -inch from the splice end down to the toe of the bead. The step-down from the tread edge should



Side Section Which Is Ready for Building Up.

be $\frac{1}{2}$ -inch and approximately that from the lay back end. If two plies are removed, the second should be stepped in $\frac{3}{4}$ -inch all around and removed to the toe of the bead. After buffing and cementing in the usual way, two plies of new fabric are added, allowing the usual $1/16$ -inch lap.

Both plies in this repair extend over the toe of the bead. The inner ply ends at a point two inches beyond the injury and the second ply lacks $\frac{1}{2}$ -inch of reaching to the edge of the first. An inside boot is used, all building-up being similar to that already explained.

Parts Manufacturers Will Discuss Timely Automotive Topics.

This year's convention of the Motor & Accessory Manufacturers' Association, at Buffalo, N. Y., September 13, 14 and 15, will be a real congress of the automotive industry.

In view of the record-breaking production of cars and trucks during the month of April, May and June, executives are eager to survey the trade horizon and exchange viewpoints with leaders in all branches of the business. The opportunity for this sort of discussion will be afforded at the various general sessions and departmental conferences at the Buffalo convention.

Alfred Reeves, general manager of the National Automobile Chamber of Com-

merce, will speak on "Trends of the Industry and the Outlook for 1923." The discussion following this address will be lead by A. H. D. Altree, vice-president of the American Bosch Magneto Corp.

"Integration and Mergers in the Automotive Industry," a topic of timely and paramount interest, will be discussed by C. A. Dana, president of the Spicer Mfg. Corp. Mr. Dana is one of the outstanding authorities on this subject, because he has been a leading figure in several important consolidations during the last few years, involving the Spicer Mfg. Corp., the Parish Mfg. Co., the Sheldon Axle & Spring Co. and the Salisbury Axle Co.

T. M. Simpson, credit manager of the Continental Motors Corp., will speak on "How Creditors Can Aid in Rejuvenating and Reorganizing Embarrassed Companies."

One or two bankers, of national reputation, will address the convention on financial problems of the automotive industry. Several other topics and speakers assigned to discuss them will be announced later.

The programs for the special sessions of the advertising managers' council, the traffic managers, and the export managers will also be announced shortly.

1. Always have the repair perfectly dry before applying the cement. Cement will not stick to damp material.

2. Three coats of cement are applied and each allowed to dry before brushing on the next.

3. Cemented tires should not be placed in a draft. If this is done the cement will crust over on the top and remain damp underneath.

4. Use the best cement obtainable.

5. Cement may be dried too long before the materials are put on. It will lose its power of adhesion by forming a crust.

6. Good grades of vulcanizing cement should be cut two to one. One gallon of high-test solvent to one gallon of cement.

Cementing Rules Which Should Be Carefully Observed.

How Do You Handle Your Credits?

Jim Dodge Offers a Tip to Those Who Are Lax in Credit Methods—Many a Business Ruined Through Too Much Leniency in the Matter of Payment of Accounts—Get Definite Promises of Payment and Keep After Them

By J. N. Bagley

From the time Soda Springs was laid out and the first building put there, there has never been a better mechanic in the town than Jim Dodge. Jim was one of the best liked, all-round fellows any one ever knew. He was a friend to everyone but Jim, and ran his ship of business on to the rocks because he couldn't say "No." Credit methods ruined Jim just as they have ruined hundreds and thousands of other small business concerns each year.

The best plan for the small business man who knows nothing about credits, etc., is to do no credit business at all and he will lose nothing. Many will say this cannot be done, nevertheless, it has been done. The writer recalls an instance of two garage dealers in the same town, of 1,150 population, one doing a cash business and the other doing a credit business.

Three years from the time they started, the dealer doing the credit business was down and out. He couldn't pay his bills because he couldn't collect the money due him. The other man continued in business just two years longer, when he sold out. With the money he had made he purchased a farm, paying cash for it. He also purchased a tractor and a complete set of farm implements, for which he also paid the cash.

This man always discounted his wholesale bills and, while this was only two per cent and in some cases five per cent, it amounted to quite a little in the course of a year. No matter how good a customer may be, from a standpoint of good business if he habitually takes two, three or less of he habitually takes two, three or five months to clean up his account after he purchases.

As a rule, the small dealer needs the money in his business much more than he needs this customer's business. In other words, you are not in the banking business and cannot afford to lend your money to your customers, for that is, virtually, what you are doing when you extend to them the credit asked for.

And you go about it differently than your banker does at that. Your customers say:

"Bill, put that on the tab for me a few days."

You reply, "All right, Jim."

But should Jim go to the bank and ask for the same amount of credit for a few days, the banker, if he were absolutely good, would first push a note through for him to sign after which he would be given the money at the regular rate of interest.

When you want your money, you send Jim a statement and, being just a little hard up, he pays no attention. Thus the matter runs along for weeks or even months. When the note comes due the banker drops Jim a notice and he at once comes in, pays the account or pays the interest, and

BE THRIFTY AND HAPPY.

The spendthrift is never happy, never satisfied. He knows no peace of mind. Have you ever known any one who regretted having saved money?

Have you not known many who regretted not having saved money? A bank account raises a man's self-respect, enhances his manliness, increases his self-confidence, strengthens his peace of mind, and thereby makes him a better employe, a better citizen, a better father.—B. C. Forbes, in the Golden Rule Magazine.

renews by giving a new note and again the amount starts to draw a new interest.

If you must do a credit business, do it in such a way that you can cash your paper when you need the money to take care of your own obligations and not endanger or ruin your credit by extending credit to customers who pay when they feel like it. One should never forget the fact that goods on the shelves are figured as assets, while "Accounts Receivable" may easily be figured a liability.

Before extending credit to a customer who is not known to be absolutely good, a very good plan is to find out from whom in the city he has previously obtained credit and get into touch with these people over the telephone, asking for the person who handles the credits. The information received will, in nearly every instance, be sufficient to extend a fairly safe credit, or it will be such that it will be good business to keep the goods on the asset side of the ledger.

In the course of time, if credit is extended, there will creep in a few of the fellows we term "slow payers"—they may be good but slow. At any rate, it is a matter of keeping continually after them until they do pay.

The only way to handle this "slow-pay bird" is to camp so closely upon his trail that he will pay to get rid of you. There are a number of ways of keeping continually after these bad accounts, but the most effective are through letters or by personal

calls. Either, however, takes time and time is money. Therefore, it is a better method to keep Mr. Slow Pay off the books than to spend in time and stamps the profits on the transaction to get the principal back.

Most dealers send out their statements the first of the month following the purchase and, as a rule, through force of habit, more than anything else, most people pay their bills about the tenth of the month which is all well and good if they pay the tenth. If they don't, at the end of the ten days they should receive another statement, and another three days later if they fail to show up. It is not necessary to write a letter. The debtor knows what the statement is for—he knows the dealer should have the money due him.

If, after the third or fourth statement, the customer does not come in, the better plan is to make a personal call and get the money, for when a customer ignores all statements sent him it is a nine-to-one chance that the dealer is better off without his business.

In making the personal call, you will at least get a promise to pay at a certain time. Let the customer understand that on the hour and minute you will be there for the money, and not only be there but expect the money to be there.

For example, you may call on John Doe who owes you a bill for tires two or three months past due. Mr. Doe promises to pay in a few days but just at present he is a little hard up. "All right, Mr. Doe, I don't want to crowd you, Mr. Doe, but I need the money. Just what day next week can you pay me? In nearly every instance he will say "Thursday," "Friday," etc.

Now that you have a promise, make it a point to be there for the money at the exact time stated and, if he does put you off until some day the next week, make it plain to him that you will be there, "Johnny on the spot," and in nearly every case this time you will get the money, for he can see you are hot on his trail and mean business. But, every time, get the customer to name the date on which he will pay. The whole secret in collecting slow accounts is in keeping continually after them until the account is paid.

It is better to be calm when calling upon the customer—never demand that he pay. Just be businesslike and explain to him that, in order to carry on your business, it takes money and, inasmuch as you have extended credit to him at a time when he

(Concluded on page 36.)

Proper Grinding of Lathe Tools

To Get the Most Out of Lathe, Shaper, or Planer, Operator Must Know How to Grind Cutting Tools—Good Work Cannot Be Done By Using Improperly Ground Tools—Grinding and Tempering Methods Described and Illustrated

By Gustav H. Radebaugh

Repairshops may be equipped with the very best types of lathes, but results that mean profit can not be obtained unless the operator of the machine understands the principle surrounding the shop practice of grinding tools. Poorly ground tools in any shop are an indication of inexperience.

Knowing the several styles of tools is of considerable importance, as it is this knowledge that makes it possible to do so many different types of jobs in the lathe. The "know-how" of tool grinding is the one big subject that must be understood by the mechanic. Operators have difficulty in turning jobs in the lathe for the simple reason of inferior knowledge of the "how" to grind the cutting tools.

On the lathe, machine steel, cast-iron, aluminum, babbitt, brass and bronze are the metals most commonly machined. In machining each of these metals, questions come up as to the tool and clearance angles that must be understood or discouraging difficulties will be met.

Lathe tools are divided into two general classes: Solid forge tools and the tool holders. The solid tool set that was so common among lathe operators a few years ago is shown in Fig. 1. This set has 12 different tools. The objectionable feature to these tools is the excessive weight of the tool steel used in each tool. With the

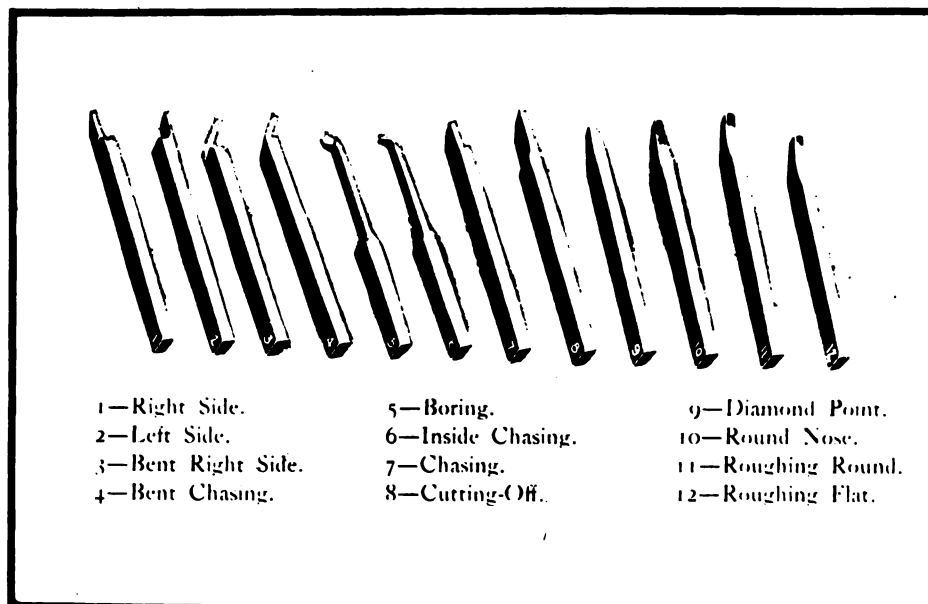


Fig. 1. Twelve Different Shaped Tools Which Are Used on the Engine Lathe.

universal adoption of high-speed steel for all lathe tools, it would be prohibitive at its cost to continue the use of solid tools, but the forge tool is not entirely obsolete.

Some of the best shops use the forge parting tools, side tools and boring tools. These are forged from carbon steel, so

their cost is entirely justified. In this set there are six distinct tools—the side, chasing or threading tools, cutting off or parting, boring, diamond and two round-nose tools.

It will be noticed, as a reference to the names of the tools in the illustration will show, that some of these tools are bent and shaped to right or left-hand work. The side tool, for example, is made right, left and bent right side shapes. The range of usefulness of these tools is limited but, by forging and redressing occasionally, the solid tool can be made to fit into practically all the necessary nobs found in lathe work.

The tool-holder idea has developed very rapidly, as every mechanic appreciates the convenience of this style of tool. The tool holder is designed to hold a high-speed steel bit, which eliminates the excessive weight represented in the solid tool. If each of the solid tools in the standard set weighs two pounds, these tools represent 24 pounds of high-speed steel, at \$2.40 per pound, giving a cost of \$57.60. This would buy the necessary tool-holder set shown in Fig. 2, leaving a considerable surplus.

The holders will render long service. The wearing-out part is the bit or blade. These can be replaced at a very nominal cost. These tool holders will be found much more economical to use than the solid tools and should be found in every shop. Another very important item entering into the use of the tool holders is the elimination of the necessity of forging tools. It

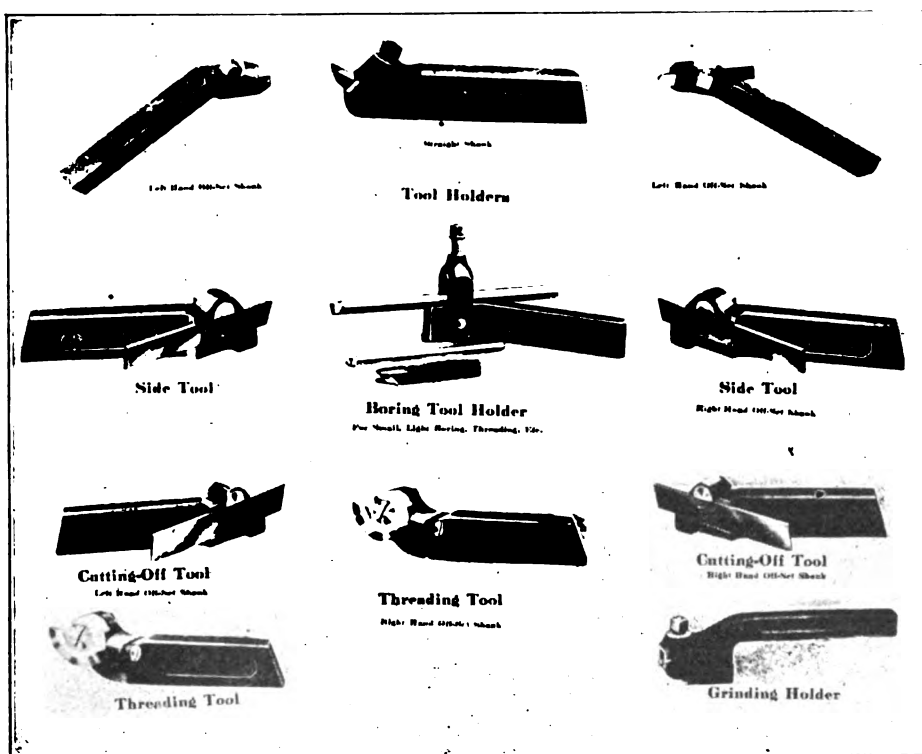


Fig. 2. Tool Set Necessary for the Successful Operation of Engine Lathe.

is not a difficult job to forge the solid tool, but this operation requires time and some patience.

The straight, left and right turning holders, right and left side-tool holders, right and left cutting-off holders, thread-

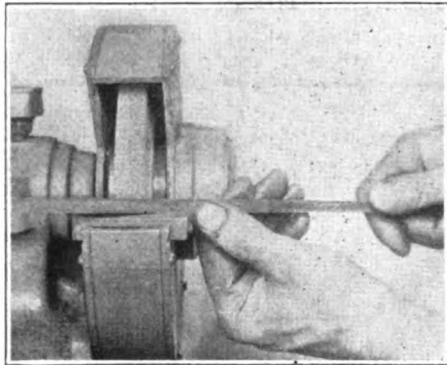


Fig. 3. First Operation in Shaping Tool Bit—Grinding From Bar.

ing tool, and boring-tool holders, give to a lathe operator a sufficient number of shapes of holders to do almost any kind of a job. In the straight, right and left turning holder, square high-speed-steel bits are used.

These holders are made in sizes $\frac{1}{4}$ -inch; $\frac{5}{16}$ -inch; $\frac{3}{8}$ -inch; $\frac{7}{16}$ -inch; $\frac{1}{2}$ -inch; $\frac{5}{8}$ -inch. The $\frac{5}{16}$ -inch holder is the popular size for the 12 to 14-inch lathe and the $\frac{3}{8}$ -inch holder the size commonly used on lathes larger than 14-inch. It is, however, common among some lathe operators to use a larger tool bit on the smaller lathe, as they stand up much better and it is not necessary to grind the tool so often.

The $\frac{3}{8}$ -inch tool bit is large enough to do fairly heavy work, and is also adaptable to the smaller turning jobs. The steel for these holders is supplied by any supply house—ground and hardened, for use.

A good many shops prefer buying the steel in the stock lengths, shaping and hardening the tools in the shop. By following this scheme, it is considerably cheaper and fully as good results can be

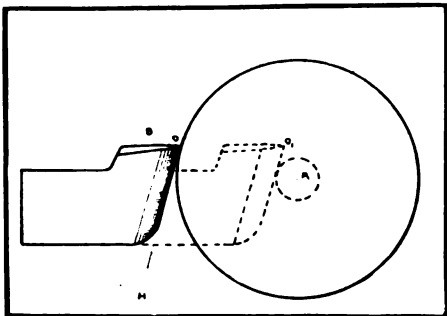


Fig. 5. Showing the Cutting Angles of a Lathe Turning Tool.

accomplished from the tools made in the shop as from those purchased.

In Fig. 3, is shown the first operation in shaping a tool bit. To cut the steel to the desired length, it should be nicked on the corner of the wheel. One of the most common ways this is done is to grind the

steel on the four sides. To do it in this manner is wasteful in material and time, as a considerable amount of the steel must be ground off to square the end of the tool so that the cutting edge will be on the face of the steel.

Some shops buy two lengths, cut to size, believing the best way to buy treated H. S. steel is in short lengths made in accordance with size of tool holder.

The proper way to grind the steel is to grind heavily on one side, which will represent the bottom of the tool, and grind lightly on the two sides which represent the side of the tool. Grinding in this manner serves a double purpose. After the steel has been nicked, as shown in Fig. 3, the bar of stock is placed in the bench vise and the bit is snapped from the bar by a light blow from the hammer.

The length of these bits varies in the different shops, but the adopted standard of length is shown in a table given in this article.

Tool bits should be made as long as possible, so that the steel waste will be held down to a minimum. This table gives the longest lengths of bits that can be used in a holder without danger of breakage of the tool or chattering of the work. To

| Bit Sizes. | Length in Ins. |
|----------------------|----------------|
| $\frac{1}{4}$ | $2\frac{1}{8}$ |
| $\frac{5}{16}$ | $2\frac{3}{4}$ |
| $\frac{3}{8}$ | $3\frac{1}{4}$ |
| $\frac{7}{16}$ | $3\frac{3}{4}$ |
| $\frac{1}{2}$ | $4\frac{1}{2}$ |
| $\frac{5}{8}$ | $4\frac{3}{4}$ |

Table of Adopted Standards for Tool Bit Lengths.

shape the steel into the tool desired, the bit is placed, preferably, in the grinding holder. Of course this can be done in the tool holder and ground as shown in Fig. 4, to the shape desired. In this view the operator is grinding on the angle of side clearance on a threading tool.

Rake and Clearance.

The shape of the tool's cutting edge is very important. The angles on a tool are known as "front rake" and "side rake" and "clearance." The clearance angle is large in lathe tools, to allow setting the cutting edge of the tool above the center of the work.

In tools used on the planer, boring mill, shaper and slotter—also on large boring-bar work—this angle is made only sufficient to give a slight clearance back of the cutting edge. Front rake is the effective angle of keenness for the front of the tool. Side rake is the effective angle of keenness for the cutting edge on the side of the tool.

In Fig. 5 the dotted lines show the position of a tool when set high and fed to the center of the stock. When turning down large stock to small diameters, it is necessary to adjust the tool height during the operation.

In cutting the various metals, these angles change. Many operators try to turn brass with a tool ground in the same manner as when cutting steel. This leads to difficulties that are damaging to the job. For example, when dressing up an armature

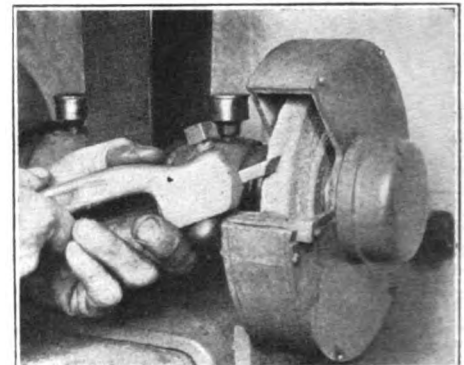


Fig. 4. Second Operation—Shaping Tool Bit From Bar.

shaft from the tractor-engine magneto, or from the generator from a domestic power plant, the tool gouges into the armature, causing a large scar to be made on the brush surface. Many a good armature has been ruined by such practice.

To avoid all danger of tool gouging into such work, eliminate the angle of front or top rake. This is done as illustrated in Fig. 6. The top of the tool bit is ground parallel with the tool-holder shank. This eliminates the angle which causes the tool to gouge or lead into the work.

All tool holders are designed to give front or top rake to a tool by the angle being placed in the holder. Many mechanics grind a lip on the tool when grinding these tool bits. This is a waste of steel, as the holder is designed to give the angle without this grinding on the top of the tool. Lips are only ground on tools which are used for turning wood and bab-bitt.

There are nine different shapes of tool

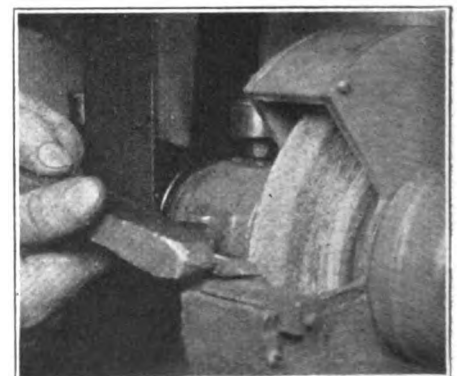


Fig. 6. A Different Shaped Tool Is Used for Brass Turning.

bits that can be used in one turning-tool holder. It is very convenient when turning a job to have all these tool shapes accessible. These nine shapes are shown in Fig. 7. The names of these tools in most cases explain the uses to which they are put.

The left and right-hand, and straight, round-nose turning tools are for finishing cylindrical surfaces—especially termed “turning”—and are made to be fed toward and away from the hard stock. The left and right-hand side tools are used for finishing up opposite sides of radial surfaces, or “squaring up” as it is termed in the shop. The square-nose tool is used for cutting square grooves, such as are found in pistons.

To get the best service from the tool holders, the tool bits must be ground and shaped properly. It is the practice, among some mechanics, to grind tool shapes on each end of the bits. This makes tool changes more convenient and reduces the amount of steel in the possession of each operator.

To assist in the proper shaping of these bits, a template or chart, placed at the side of the grinding stand, will be found a decided advantage. Too many times, no consideration is given to the shape of the bit. The tool is ground having an angle of clearance, and is considered sufficiently ground to do a good turning job. The better practice of shaping the tools to an adopted standard, as shown in Fig. 7, is accepted by every experienced lathe operator.

To make the best use of the template given in Fig. 7, this illustration should be cut out and pasted on a stiff backing of cardboard. After the glue or paste is thoroughly dry, give the card, front and back, a thin coat of white shellac. When the template gets dirty and greasy from shop handling, this makes it possible to wash it with gasoline.

High-speed steel can be hardened to a satisfactory degree by heating slowly to a temperature of 2200 degrees Fahrenheit or until the end is at a dazzling white heat and shows signs of melting down. The tool point is then plunged into a bath of linseed, cottonseed or kerosene oil until cooled.

In Fig. 8, the operator is quenching the tool in kerosene, as it is generally found

in the shop supplies. When heating a tool bit for hardening, a good thick fire should be made in the forge. It is injurious to the steel to permit the air from the blast to come into contact with it while heating.

These small tool bits, after hardening, should be “let down” or tempered to toughen the bit and prevent it from breaking when placed in the holder. To do this, place the hardened bit into a lead bath and heat to 400 degrees. It is then permitted to cool down slowly.

Another very simple method is to heat a piece of steel plate, $\frac{3}{4}$ -inch by 2 inches, or heavy enough to hold heat and, after polishing the side of the tool bit, place on the hot plate until the temper color shows a very light straw. Then remove the bit and permit to cool slowly.

The “let-down,” or tempering process, is not absolutely necessary on these tool bits but it is advisable. Tool bits also break when placed in the holder, caused by warping received in the hardening process.



Fig. 8. Kerosene With Small Quantity Sal-Ammoniac Suitable Bath for Hardening Small Tool Bits.

The practical way to overcome this difficulty is to grind the bottom and top of the tool bit flat, so that, when the tool-holder screw comes down on the tool, there will be no excessive or irregular pressures.

To finish up the tool, it is ground as shown in Fig. 9. The tool bit is held in the hands in this operation while in shap-

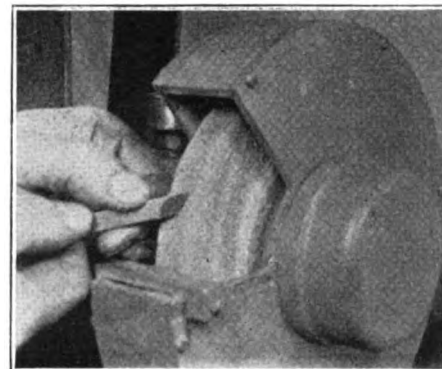


Fig. 9. Sharpening Up a Threading Tool After Hardening.

ing the tool bit, as in Fig. 4, it is held in a grinding holder. When grinding the tool to the proper shape, the grinding balance can be maintained much easier by holding the bit in the hands. The operator can control the heat generated in the tool to a degree of certainty, as there will be no danger of drawing the hardness if the tool can be held in the hand. To do a good job of tool grinding, support the tool on two fingers as shown in Fig. 9, and hold the steel firmly and steadily against the grinding wheel.

When being used, tool bits are occasionally “stoned,” or sharpened, with a small oil-stone. Oil-stones, to give good service, must be properly taken care of. Too many times oil-stones found in the metal repair-shops are glazed and dry, and are either slow cutters or will not cut at all. To overcome this difficulty, soak the stone over night in kerosene as in Fig. 10.

To get service from a stone, it should be kept clean and moist. Allowing it to remain dry for a long time, or exposing it to the air, tends to harden it. The larger oil-stones should be kept in a box having a close cover and the smaller stones placed in a covering such as that shown in Fig. 11. After using the stone, it should be wiped off with a clean rag and a few drops of fresh, clean oil should be placed upon it.

This is very important, for dirty oil left on a stone dries in, carrying with it the steel dust formed on the surface of the stone when whetting. This is what causes the stone to glaze. After a stone becomes glazed or gummed up, cleaning it with ammonia will restore its cutting qualities. If this does not clean up the stone, scour with carborundum grain, or a piece of sandpaper fastened to a board.

For use on turning tools, a soft, free grit, quick-cutting stone is required. Oil-stones are natural and manufactured. Some mechanics prefer the natural stone, while others use the manufactured stone very successfully.

In Fig. 11, the operator is shown stoning the tool with a manufactured stone. This operation is essential, as it brings the edge to a degree of keenness that can not be obtained on the grinding wheel. In stoning the tool, all the wire edges are removed,

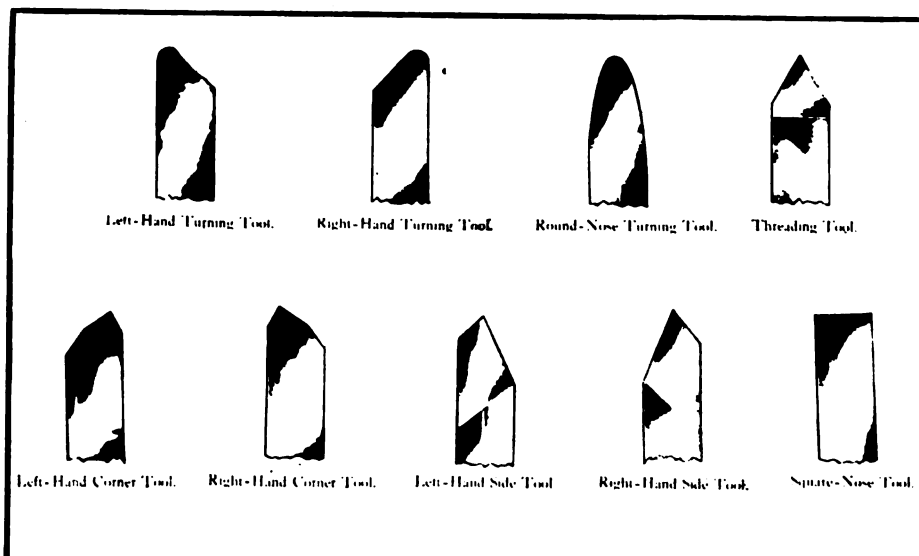


Fig. 7. Standard Shapes Used In Grinding Lathe Tools.



Fig. 10. Proper Treatment of Oil Stones Makes Them Cut Better.

and the face of the steel smoothed down to a degree which enables the steel to stand much better under the cut.

The tool is next inspected for correctness in shape. As this is a thread tool, the center gage is used to test its shape of 60 degrees. The method of using this gage for testing thread tools is shown in Fig. 12. This gage is also used for testing the shape of the live and dead centers of the lathe, and the correct setting of thread tools

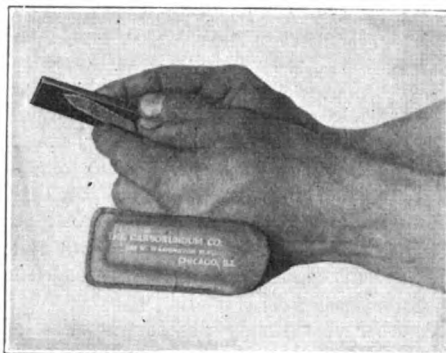


Fig. 11. Stoning Up a Tool Used for Cutting Threads.

steel the tool posts will take before ordering.

The usual size of steel used for a forge tool used on a lathe is as follows: (A) lathe 10 ins. by 12 ins. in swing, tool made from $\frac{3}{8}$ -in. by $\frac{3}{4}$ -in. by 6-in. steel; (B) lathe 14 ins. by 16 ins. swing, tools made from $\frac{5}{8}$ -in. by $1\frac{1}{4}$ -in. by $9\frac{1}{2}$ -in. steel; (C) lathe 16 ins. by 18 ins., tools made from $\frac{5}{8}$ -in. by $1\frac{1}{2}$ -in. by 11-in. steel.

In forging tool steel, have a deep fire of coke and light blast. The proper forging

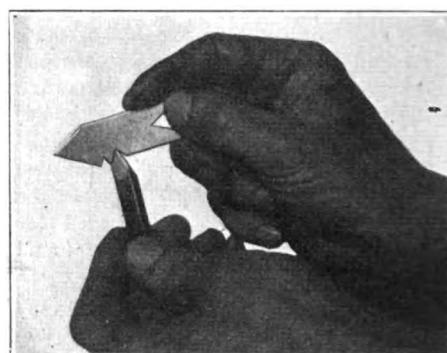


Fig. 12. Testing Shapes of Thread Tools With Center Gage.

low the hardening temperature, as there is danger of causing small check cracks to appear in the steel.

After the steel has been forged, it can be laid to one side to cool down, or conditions may demand that the tool may be annealed so that it can be filed or machined to the shape desired. Ordinarily, the tool is shaped on a grinding wheel. This should be done before the tool is hardened and tempered, as it prevents the possibility of

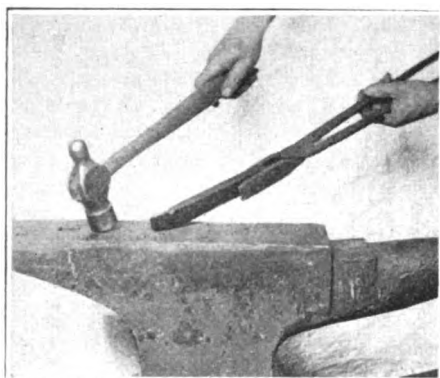


Fig. 13. Method of Shaping or Redressing a Solid Turning Tool.

in the tool post when cutting threads in the lathe.

To make a solid lathe tool, the steel is forged to the desired shape, as shown in Fig. 13.

The size steel that these tools are made from is regulated by the size lathe on which they are to be used. Most tool posts fitted on the different swing lathes are standard, but it is best to measure the size

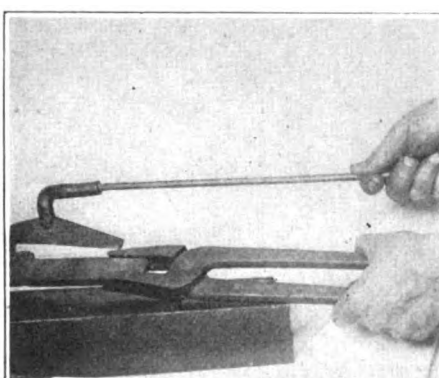


Fig. 14. Test With Magnet for Proper Hardening Heat.

heat for carbon steel varies as to the grade of steel but, in general practice, forging at a bright red, when only a small amount of forging is required, is adopted as the proper heat. This heat should be just a little above the hardening temperature.

If a considerable amount of forging is done, the steel should be worked at a yellow heat. At this heat, the metal works easier and the pounding refines the grain. Never hammer a tool at a temperature be-



Fig. 15. Method of Hardening the Tool Preparatory to Tempering.

drawing the temper during the grinding operation. It is not good practice to dip the tool in water after the forging is completed.

Hardening and Tempering the Carbon-Steel Forged Tool.

After being ground and shaped, the tool is ready to be hardened and tempered. Heat the carbon tool in a clean, thick forge fire,



Fig. 16. Polishing Hardened Tool So Temper Colors Can Be Seen Easily.

| INDICATING COLORS FOR TEMPERING HARDENED TOOLS CARBON TOOL STEEL | | | |
|---|-------|----------------------------------|-----------------------|
| SHARP TOOLS | TEMP. | COLOR | FILE TEST |
| HAND SCRAPERS | 210° | (TEMPER IN BOILING WATER) | HARD AS FILE |
| LATHE TOOLS, LIGHT AND HEAVY WORK, MILLING CUTTERS, REAMERS, TAPS, DIES, PUNCHES & FLAT DOLLS | 460° | STRAW COLOR | VERY SLIGHT SCRATCH |
| WOOD WORKING & TURNING TOOLS, MACHINISTS' HAMMERS | 500° | BROWN-YELLOW | VERY SLIGHT SCRATCH |
| COLD CHISEL LIGHT WORK | 530° | LIGHT PURPLE | SCRATCHES |
| AXES | 550° | DARK PURPLE | SCRATCHES |
| COLD CHISEL ORDINARY WORK, SCREW DRIVERS | 550° | BLUE TINGED SLIGHTLY WITH PURPLE | FILES WITH DIFFICULTY |

Fig. 17. Table Which Indicates Colors for Tempering Hardened Tools.

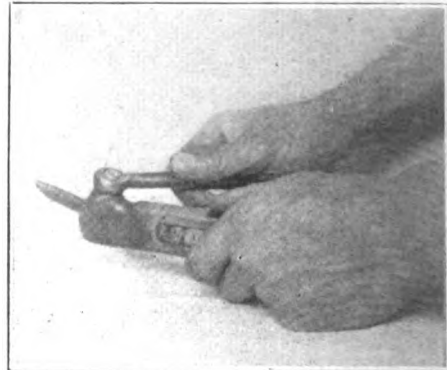


Fig. 18. Improper Method of Clamping Tool Bit in Holder.

to a bright red. Do not permit the tool to soak in the fire, as this causes the grain of the steel to become coarse. The tool should be heated on a portion of the body as well as the cutting edge. This heat is

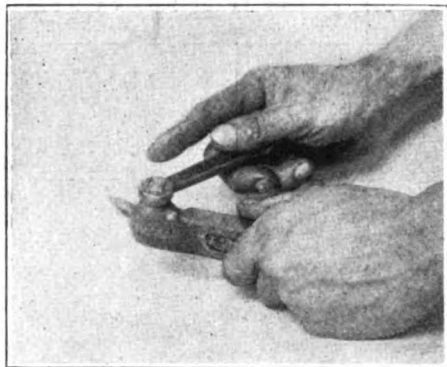


Fig. 19. Proper Method of Placing Bits in Holder Eliminates Breakage.

used to draw the temper. In heating the tool for hardening, the proper heat can be determined by using a magnet, as shown in Fig. 14.

When the steel is hot enough that the critical point is reached, the carbon steel, known as "pearlite carbon," changes into a hardening carbon and ceases to be magnetic. It is at this heat that the hardening of the steel can and must be done.

Other ways have been established to determine this hardening point or the decalescence point of carbon steel—that is, by the color of the hot steel. When carbon steel reaches a bright red heat, you are pretty sure that it is the proper time to cool the tool suddenly, before the hardening carbon changes back to pearlite carbon. This sudden cooling is done as shown in Fig. 15.

The cutting section of the hot tool is dipped in a quenching bath, leaving the body of the tool extended above so that it will not be cooled at this time. After the end of the tool is cooled down so that it can be touched with the finger, it is removed from the bath and brightened as shown in Fig. 16.

Quenching baths are of considerable importance in the hardening and tempering processes. Several different baths are used successfully by tool dressers. The importance of these baths is regulated by the

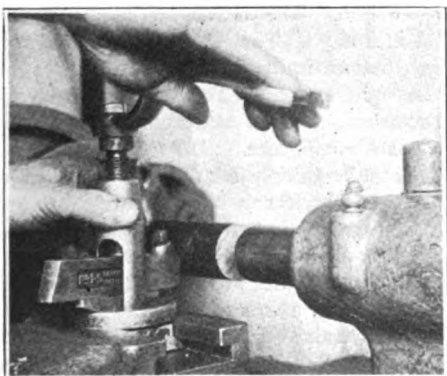


Fig. 21. Tightening Up Tool Holder Properly Eliminates Danger of Slippage.

rapidity with which the heat is absorbed by the bath when the heated tool is plunged into it. This affects the degree of hardness. A salt-brine, soft-water hardening bath dissipates the heat rapidly from a tool, and can be used very successfully in hardening lathe tools.

Adding 3 per cent sulphuric acid to this bath cleans the tool so that it is bright and clean when taken from the bath. Do not use hard water, as unsatisfactory results will be obtained.

Tempering the tool as shown in Fig. 16 is the most interesting operation of making a forged turning tool. Remember that the tool has been hardened. This means that the pearlite carbon is held in the form of hardening carbon in that part of the tool cooled in this quenching bath.

The tool in this form is as brittle as glass. To soften, or to make the steel less brittle, it is tempered. As already stated, the cool end of the tool is brightened. This

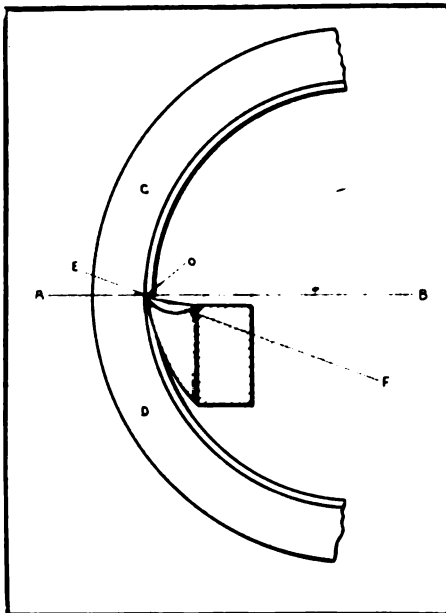


Fig. 23. Shows Cutting Angles of a Lathe Boring Tool.

is done to reveal the color changes caused by the rise in temperature of the cooled end, the heat coming from the heated body of the tool. As the temperature increases, various colors appear on the brightened surface. First a faint yellow, it then blends into a straw; then light brown; then dark brown, purple, blue and dark blue, with intermediate shades, are the common colors developed.

Tools used for various purposes receive different degrees of temper. The only possible way for small shop operators to gage these temper degrees is by the color change shown on the steel when tempering. A reference to the table given in Fig. 17, shows the temperature and corresponding colors for tempering some of the common tools.

A very practical test is also suggested for each type of tool, to determine the degree of hardness. When the color shows

up on the brightened part of the tool as in this case—as reference to the table Fig. 17 shows—the lathe tool is tempered at 460 degrees or, at a straw color, the entire tool is quenched. It is next sharpened and

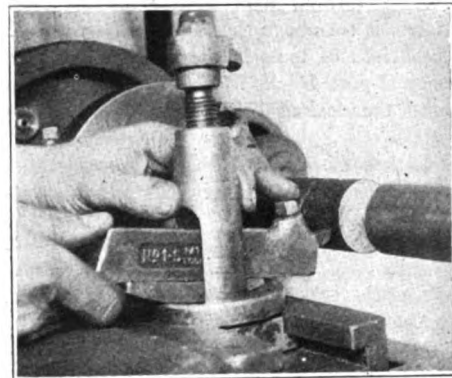


Fig. 20. Adjust Tool Holder in Tool Support for Proper Height.

stoned, and so is made ready for the lathe.

When tempering small tools and it is impossible to hold heat in part of the tool to draw the temper, a piece of steel large enough to hold heat can be heated to red heat and the hardened job laid on it until the temperature rises in the job and develops the temper colors. This is a very useful practice to follow when tempering small screws, keys, pins, gears, etc.

Placing Tool for Turning.

If the tool-holder bit is placed in the tool holder as shown in Fig. 18, there is danger of breaking the bit. This seems to be a very common habit, and it should be discarded as considerable steel can be wasted by following this practice. When placing the bit in the tool holder, examine closely for chips or foreign particles on the bottom of the square holes. Many bits are broken on account of improper barring surface. The screw tightening down on a bit having an uneven support is sure to snap the steel if it has not been let down or tempered after hardening.

To get the best service from a tool holder and bit, place the turning steel in the holder as shown in Fig. 19. This eliminates danger from breakage, as well as reducing chattering to a minimum. Tighten down the screw on the steel bit securely,

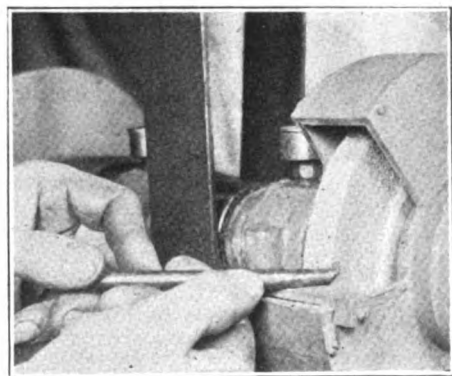


Fig. 22. Most of Grinding of Boring Tool Done on Side and Edge of Wheel.

with the special wrench supplied with each holder. The wrench is then removed, and the tool is ready to be placed in the tool post.

In turning a job, such as shown in Fig. 20, the turning tool, as has already been stated, is set above the center. To regulate the height of tools in the lathe, the rocker, or tool-post block, is shifted up or down until the desired height of the tool is secured.

Lathes of different makes are provided with several means of making this adjustment, but it will be found that the rocker block is the simplest and most effective method for the small lathes. Notice in this illustration the method of holding the tool to make this adjustment easily and rapidly.

Don't forget the importance of the adjustment, as a tool—even though ground to an absolutely correct edge—will not cut properly unless it is set as it should be in the tool post. The tool post on the compound rest should be set so that the tool can cut up close to the lathe dog without permitting the dog to strike the compound rest.

In clamping the tool in the tool post, guard against the possibility of changing the height of the tool during this operation. To clamp the tool in the tool post, adjust the tool crosswise in the slot of the tool post, as shown in the Fig. 21, causing each side of the tool to come into contact with the two opposite corners of the tool-post slot.

This is an old job kink which helps to prevent the tool from shifting in the tool post. After the holder is set during the job, the tool bit may need sharpening. It is not necessary to loosen the tool holder in the tool post, thus loosening the adjust-

ment previously made. Just remove the tool bit from the holder and sharpen. It is obvious that time can be saved by doing this.

Boring Tool for Light Job.

The boring-tool bar, as shown in Fig. 22, is made from round, high-speed steel. The nose is forged on the round stock, hardened and tempered to the proper degree of hardness, and is then ground on the side of the wheel as shown in the illustration.

As to the shape of the tool, it should be a duplicate of the round-nosed tool shown in Fig. 7, but the angles are somewhat different as a comparison between Fig. 23 and Fig. 5 will show. Boring tools cut better if a small lip is ground on the tool. This is shown in Fig. 23. Notice the increased angle of clearance. This is necessary to prevent the heel of the tool from riding in the hole.

On some boring jobs it is necessary to shape the tool in a special form to fit the job. These tools can also be made from the square stock used for the turning tools, as the boring-tool holder shown in use in Fig. 24—which is designed to hold a round or square boring tool holder—is a decided improvement over the old style solid tool and should be found in the tool equipment of every lathe.

The most advantageous feature of this tool is the adjustment of the boring bar to the length required to bore the job. When a hole is to be bored, this tool can be extended from the tool holder only the necessary length to do the job, eliminating springing and chattering, which is generally found when boring a hole with a long boring tool.

A Few Tool Positions.

When machining jobs in a lathe, it is necessary to understand the proper tool

conditions and just how the different styles of tools can be applied to the job at hand. A few applications of tool shapes in holders to work are shown in Fig. 25. A careful study of this picture will give a general idea of how to set tools on the jobs

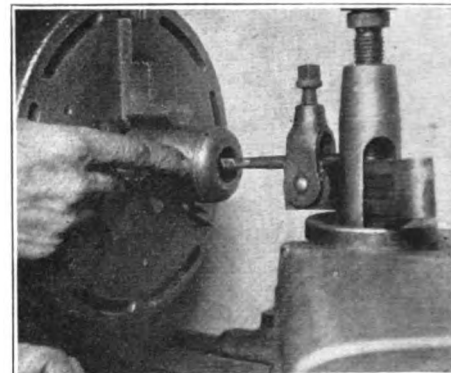


Fig. 24. Setting the Boring Tool Bar and Holder in Tool Post.

that are most common in machine operation. To get the most out of turning tools, the proper turning speeds and feeds must be known and used.

"What Next?" Asks the Public. Ching Ling Foo May Answer.

"Mystery demonstrations" have become the vogue as competition in the automotive field grows keener. Press reports recently tell of cars that talk, that see, that obey the commands of persons not in them as though they were under a magic spell.

L. D. Reed, a driver of one of the now famous Mitchell "White Streaks," which are operating throughout the United States, is the inventor of one of the latest stunts which is entertaining and puzzling the motoring public of Boston.

Reed drives his car into a crowded section of the city, throttles it down to a very slow speed in high gear, and then jumps out and runs ahead of it. This car follows him like a pet dog. While the populace is still gasping, he turns about, faces his car and commands it to stop, which it does with uncanny promptness.

Reed then commands the car to follow him again and to the astonishment of everyone there is a whir of the starting motor and the "White Streak" starts to crawl after him. The headlights blink on and off at a word. The Klaxon sounds a warning automatically if anybody intrudes on the right of way. To all intents and appearances, it is an automobile actuated by human intelligence.

Reed laughingly admits that his demonstration is trickery but he refuses to reveal his method of operation and so far no one has discovered his secret.

A demonstrating car in the same city, operated by a competitive firm is almost as well trained. This car apparently can talk and see. If a modern "flapper" type of girl passes by, his car starts a shameless flirtation by calling out some such greeting as "Pretty, Pretty."

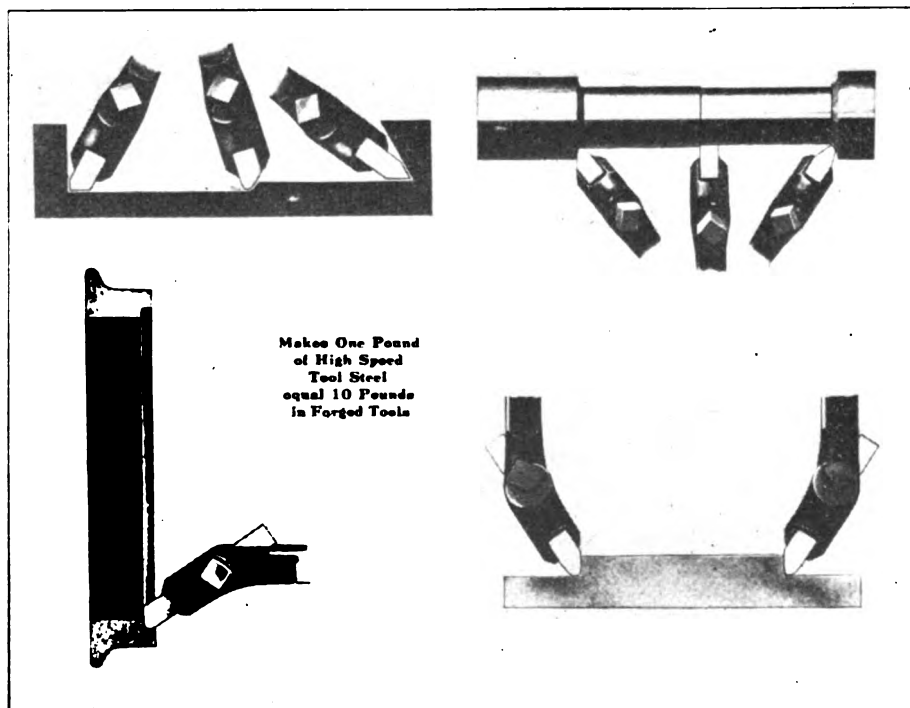


Fig. 25. A Few of the Applications of Tool Shapes in Holders to Work.

Some Business-Stimulating Ideas

Free Service Plan of Indiana Company Pleases Customers—Map Tells Sales Made and Is Good Publicity Feature for Dealer—Some Tire Advertisements That Brought Results—Other Advertising “Stunts” That Are Effective

“Our Customers Must Be Satisfied!”

“Our Customers Must Be Satisfied!” is the slogan of the Pennell Auto Co., of 810-816 Harrison St., Fort Wayne, Ind., of which John C. Pennell is the owner. It is interesting to note the manner in which this company gives a great amount of free service to all Ford owners in living up to this slogan.

Whenever a Ford owner goes into the Pennell Auto Co.'s service department for minor repairs, he is quite likely to be told by the mechanic who handles the repairs that there is no charge. The mechanic will then hand him a card whose face reads like this:

“We Thank You for Bringing in Your Car.”

“We are in business for the sole purpose of selling Ford products and to satisfy—in every respect—those who are using Ford products.

“It is our intention that you never leave our store until you are satisfied in every respect. We ask you, therefore, to refer any complaints whatsoever to either Mr. Keller, Mr. Butler or Mr. Pennell—general manager, service superintendent and owner respectively.—‘Our Customers Must Be Satisfied.’”

On the other side of the card is a list of services which the company gives owners free of charge. It reads:

“The following is a partial list of the services we render Ford owners—gratis:

- Start car within city limits.
- Clean spark-plugs.
- Replace spark-plugs.
- Clean commutator.
- Replace commutator.
- Replace commutator roller.
- Adjust coil points.
- Replace coil-unit points.
- Replace fan belt.
- Adjust bands.
- Focus headlights.
- Replace priming wire.
- Test magnets.
- Test storage battery.
- Flush out radiator.
- Install tire chains.
- Replace headlight lens.
- Replace electric bulbs.
- Inspect whole car.
- Replace porcelains.

Following the giving of this card to each person who brings a car into the station for service, the company then mails out another card to car owners on the same day upon which their cars are delivered to them after repairs have been made or service rendered. This second card reads like this:

Dear Sir:

Your Ford car was in our service station yesterday for repairs and it was thoroughly inspected before it was deliv-

ered to you. Did you find the work satisfactory? Even though we employ the best mechanics obtainable and have the latest improved machinery to perfect accurate workmanship, mistakes will happen.

It is our aim to satisfy our customers. Therefore, in the event that everything was not entirely satisfactory, we would be pleased if you would bring your car in again at your convenience and allow us to correct the trouble.

Of course, this sort of thing is greatly appreciated and the company's business is much benefited.

Novel and Effective Advertising.

A Canton, Ohio, automobile dealer employs a very effective and impressive method of impressing upon the prospective automobile buyers of Canton—as well as those from the surrounding territory who make frequent pilgrimages into Canton—the wide popularity and ownership of the particular make of automobile which he sells.

In one of his display windows, this dealer has a very large map of Canton and Stark counties—Canton being the county seat of Stark county—which is mounted upon an easel and is well-lighted at night with properly placed electric lights. At the top of the map appears this notice:

“We have sold — (number) — (make of car) in this county since the first of 1922. Watch this number grow.

Each pin in the map below shows the location of the purchasers of these cars.”

Push pins, having various-colored heads, are placed in the map at the precise location in the community that the purchasers live. At the bottom of the map appears a color chart explaining that pins with red heads represent roadster owners, pins with blue heads indicate touring car owners, while yellow and black-headed pins indicate coupe and sedan owners. White-headed pins indicate truck owners.

The mass of colored pins in the map very forcibly impresses the onlooker with the fact that this particular machine is being very extensively purchased by residents of this community. This map not only proves a very novel means of advertising, attracting much attention and causing much favorable comment, but it serves a very definite purpose as an effective argument to prospective customers that this make must be O. K. or there would not be so many pins in the map.

Selling the Tires.

The owners of “The Smile Station” use a good advertisement. It might be better had they used as the headline “Truth About Tires.” The reader would then know at a glance what the advertisement was about. However, as the copy appeared under the newspaper classification, “Automobiles and

Tires,” it undoubtedly received attention from those interested. Mr. Roberts says the ad pays.

TRUTH—

is stranger than fictitious imagination. These are the days of ALLEGED low prices on “blemished” tires on which the maker is ashamed to put his name.

I am closing out GUARANTEED firsts and GOOD SECONDS absolutely at COST and in some cases BELOW cost.

Even if you don't need them NOW it will pay you to buy for the FUTURE. Full stock to select from. Firestones, Kelly-Springfields, Goodyears, Hoods, Lees, Fisks and all other makes in plain, non-skid and cord treads.

This is NOT a “Pulling” ad. and I personally stand back of these statements.

Signed: F. L. ROBERTS.

The Smile Station
Corner of River Road and Main St.,
Agawam.
Near Riverside Park.

“Bardwell, the Tire Man,” as he is referred to in his home town, believes in good tires and good service, and also in letting the people know about it in a few well-chosen lines. Here's how:

TIRES PLUS SERVICE

The purchase of a tire, whether for passenger car or truck, is an investment in SERVICE. The returns on the investment come in pleasure or profit from the service RENDERED. In quality and service our tires are head and shoulders above the usual run of tires being sold today. We know that eventually the man who buys our merchandise can and will recommend us to his friends because our live and aggressive organization stands behind every sale, ready and willing to co-operate with the customer in every way.

We have no hesitation in stating that we can equip your passenger car or truck with better quality tires.

Bardwell, the Tire Man.

Here is an advertisement on tire retreading that really says something of interest and says it well. The statement that

"only raw materials are used" will make an impression on the automobile owner who gives proper attention to upkeep costs:

MR. CAR OWNER

You will find our tire retreading unusually satisfactory because we use only the latest and most approved methods. We are literally "up to the times."

Every tire that you send us will be treated for its particular ailment according to the latest process.

Our work is still further dependable because we use only raw materials.

Consequently our repairs are lasting. They add a term of life to the tire that more than pays for the cost of the work, as hundreds of our satisfied customers will testify.

A dependable service that skillfully attends to tread cuts, blowouts, rim cuts and tube punctures will be appreciated by our patrons.

We will arrange to give your repairwork special attention. We will call for and deliver the tires, and make you a price that we know will be satisfactory.

Let us know when we may call and talk this matter over with you, or telephone Walnut 2932.

The Raymond Tire Retreading Co.

The advertisement of the Hall Automobile Paint Shop appeals to the man who likes to keep his machine looking smart and fresh. This small advertisement, Hall states, costs very little per insertion and as paid wonderfully well. He keeps the same size advertisement running all the time, changing the copy when he thinks it good business to do so.

Keep Your Car New

and glossy by having it repainted when necessary so that you will be proud of it.

We have sixteen popular colors to apply to automobiles and we use the highest grades of paints and varnishes.

Good refinishing requires skilled workmanship and the workmen in our shop are experts on high class refinishing and will give your car the appearance of a new one.

Hall's Auto Paint Shop

West Springfield. Tel. River 7497.

A garage advertisement that attracts attention is shown in the illustration. The owner of the "Moon," in addition to using newspaper space in his own and in nearby

towns, uses a large sign on his building, reading:

The last going out
The first coming in

and on roads leading from the suburbs into the city—about a mile from his garage—in open lots, billboards with:

The first coming in,
The MOON GARAGE.
Watch out for it.

It is hardly necessary to state that the "Moon" is always a busy place.

Advertising Roads of The Ozarks.

Manager Lawrence H. Martin, of the South Joplin Vulcanizing Co., 601 Main St., Joplin, Mo., has started a new system of advertising the good roads of the Ozark playgrounds and his automobile tire store, by publishing an up-to-date map of the good roads to "The Land of a Million Smiles."

Martin gives every tourist who comes near his store a copy of this hand map, and has every hotel and resort in this sec-

map, says the map can be made at a very small cost to the local dealer. He has been wondering why more dealers over the country don't publish such a map for their section, giving the good roads, cities and towns for distribution to their customers, since he has found this to be good advertising.

Good Dealer Advertising.

The Dickey Motor Car Co., of Kokomo, Ind., advertised the Chevrolet with these statements:

"Back to Normalcy With A Bang! Chevrolet is 'back to normalcy' and then some. The eight great plants of this enormous company are all operating at capacity. In some of them night shifts are trying to stretch this capacity to satisfy the demand. The railroads are doing their part. Chevrolets are being loaded as fast as experienced men can double-deck them in cars. Trains are rolling out 'loaded to the guards.' Dealers all over the country are taking as many cars now in a single month as they used to take in a whole year. Isn't that evidence enough that the Chevrolet is the best buy on the market of today?"

This would take some of the "hard-times" aches and pains out of the prospective buyers.

Frank C. Pennell of the Howard County Auto Co., at Kokomo, Ind., advertised the Ford by comparing a 1917 advertisement of it with that of 1922. This was emphasized by these forceful words:

"What was true in 1917 is true in 1922. Henry Ford gave you the best car value for your money then. He does so today. You have acknowledged this by buying over 6,000,000 Fords. You have worked his enormous plant to capacity and in April caused him to make 120,000 cars. You have orders on file with him for a string of Fords, which, placed end-to-end, is more than 500 miles long."

Such an advertisement is bound to make a deep impression upon the mind of the reader.

It is safe to say that a large percentage of the buyers and prospective buyers of automobiles do not know much, if anything, about the mechanism of them, so as to really know wherein one car surpasses another. They are influenced by what the salesman says, what their automobile-owning friends say, how the machine rides, but above everything else they reason that the car with a goodly number of sales, especially local ones, must be better than others, for if there were any defects or shortcomings about it they could not fool so many people with them.

Considering this, it pays the automobile dealer to let the public know about his sales and the general sales of his car elsewhere. Where some prominent or popular person or firm purchases a car, it makes the best of advertising to mention that So-And-So has purchased a car, provided the purchaser has given his or her consent for the use of the name in the advertisement.

THE



GARAGE

**The first coming in.
The last going out.**

On the Boston Road

Repairing and overhauling by expert mechanics. Washing, polishing and storage—Low prices, fair treatment.

"Come In—We'll Use You Right"

1095 State Street

Phone Walnut 126

"Moon" Garage Always Busy.

tion carry a bunch of his road maps. And in this way, his automobile tires have received a great deal of publicity at very little expense to him or to his store.

He finds, in handing out these little maps, that the drivers of the cars prefer his routings to those ordinarily printed in the big and cumbersome official books.

At first, these little road maps of Martin's had to be pushed out to the automobile trade, but now the people, in visiting the Ozarks, call at his store for the current copy. The map is corrected every year, in order to give the summer tourist a real road guide.

Martin, in commenting on his efficient

Analyzing the Electrical System

Here Is an Analysis of the Auto-Lite System Used on the 1921 Overland Cars—Details of Ignition System and Its Operation Discussed—Methods of Handling Ignition Troubles Frequently Met, Described and Illustrated

By J. R. Bayston, M. S. A. E.,
Manager, Cooke Auto School

In previous articles, the principles of operation of the various electrical units in the automotive electrical system have been discussed. This article will deal with the details and operations of the Overland Auto-Lite system.

This system includes a separate generator and a starting motor. The ignition unit is mounted on the generator at the rear, and is driven from the generator shaft through spiral gears. The starting motor cranks the engine through a Bendix drive gear operating direct on the flywheel. The generator is a typical third-brush generator, connected to a cutout mounted separately on the dash.

The Ignition System.

The Connecticut ignition system includes an induction coil with a condenser mounted in the base and a combination interrupter and distributor. A feature of this system is that the advance and retard can be secured without rocking the whole ignition head. This is possible because the breaker points are mounted upon a plate that is mov-

able within the housing of the interrupter.

The ignition circuit is provided with an automatic circuit breaker, so constructed that the ignition circuit will be automatically opened in case the ignition switch is turned on and left in this condition when the engine is not running. If a protective device of some sort were not used, the steady flow of current through the coil would be liable to damage it.

Ignition Trouble.

An understanding of the ignition wiring will be of great assistance in locating ignition trouble. The ignition circuit in Fig. 1 is shown by the solid-headed arrows. Figs. 2, 3 and 4 show details of some of the parts of the ignition system. The ignition current comes from one side of the ammeter to the ignition switch, through this switch from the terminal 1 to 2, and down a copper strap to the terminal 3 on the circuit breaker.

Referring to Fig. 4, it will be observed that the current goes from the terminal 3 to the reset springs, across the reset con-

tacts to the balanced finger, then to the resistance winding on this finger, and through this winding to the terminal 4. Now, referring again to Fig. 1, the current goes to the ignition coil through the primary winding to the interrupter, then across the contacts to the ground, which is the metallic part of the car, and then back to the battery.

In Fig. 4, it will be noted that current flows through the ballast coil. When this occurs the coil will heat up and, consequently, heat the finger on which it is wound. This finger is made of two different strips of metal, one of these strips has a peculiar property of expanding more than the other strip when they are heated. This difference of expansion produces a bending action in the strip, causing the end of the strip to move downward and make contact with the gap-adjusting screw.

When the engine is operating normally, the current is interrupted so much that the coil does not have time to heat up sufficiently to cause the contacts to close. If,

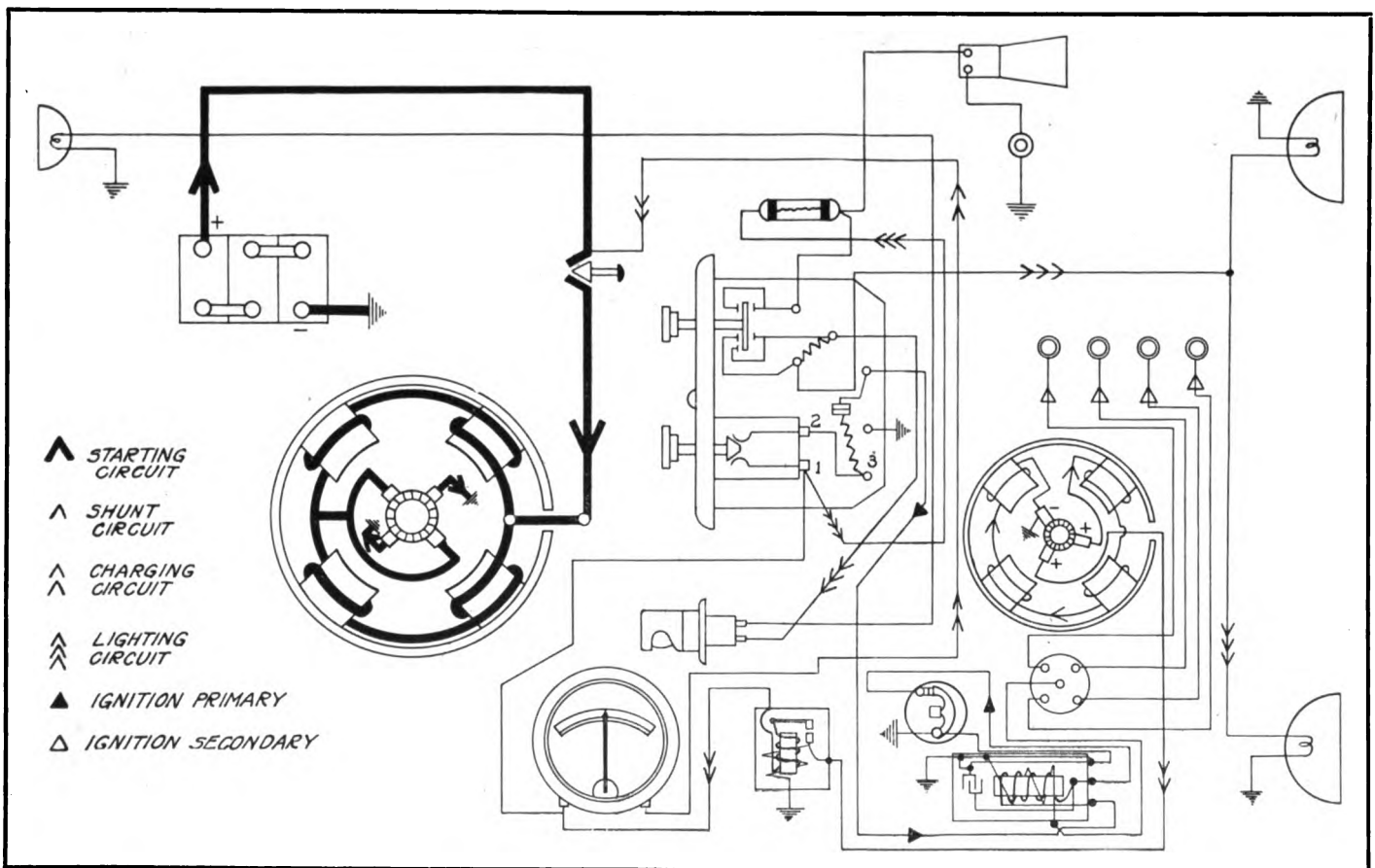


Fig. 1. Diagram of the Overland Autolite System in Which Ignition Circuit is Indicated by Solid-Headed Arrows.

however, the engine should not be running and the breaker points are closed with the ignition switch on, the steady flow of current will heat the finger sufficiently to bend it and make a contact between the points. The current will then flow to the ground

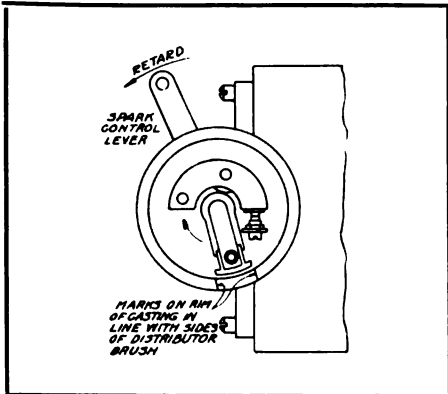


Fig. 2. Checking Ignition Timing When Removing Generator.

through the trip-finger heating coil, thus rapidly bending the trip finger upward and releasing the reset button that is snapped outward by the reset springs. This same action allows the reset contacts to open, making an open circuit in the ignition system.

The ignition breaker should trip in 30 seconds, when connected in series with the coil and a 6-volt battery. If it does not, the gap-adjustment screw should be turned so that the gap will be narrower. If the trip operates before 30 seconds, a wider gap should be made.

When the ignition circuit fails, the first thing to check is the primary circuit that flows through the coil; if it is flowing, a discharge will show on the ammeter. If, however, no current is flowing, it may be due to the breaker points being open or to the tripping of the ignition circuit breaker.

If the ignition breaker has tripped, the red sides of the button will be showing, and it will then be necessary to push in the ignition button to reset the circuit breaker. If this does not give any primary current through the ammeter, it will be necessary to

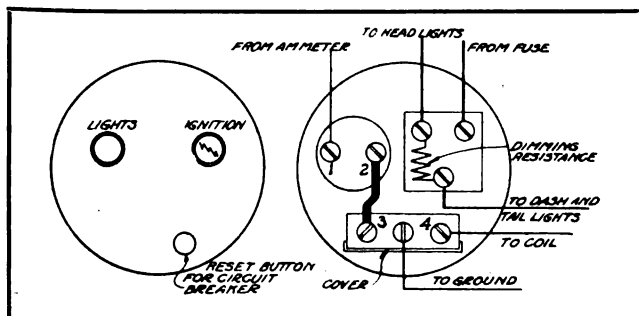


Fig. 3. Front and Rear Views Ignition and Lighting Switch With Ignition Circuit Breaker.

use a test light from the ground to the various parts of the ignition circuit so that the open may be located.

If the primary circuit is all right, and only weak sparks occur at the plugs, the

trouble is probably due to a broken down condenser or a short in the primary winding. It is most apt to be condenser trouble. If it is in the winding, a new coil must be installed, but if it is in the condenser, it is possible, in case of emergency, to install a new one. Condensers for this system can be purchased for about \$1, the coil in the neighborhood of \$9. This repair, however, would not be advisable except in case of emergency.

The condenser is made up of two strips of tin foil, a strip of wax paper being placed between them. These three strips are wound in such a way that the strips of tin foil will not touch each other. The wire is then fastened to each end of the roll. In Fig. 5 it will be noted that the condenser is connected to the two left-hand terminals of the coil. The primary is connected between the center terminal and the one at the right.

There are several methods by which a condenser can be tested. There are, however, only one of two available in the ordinary garage. A 110-volt circuit may be used for testing, an electric light bulb being placed in series in one of the leads. If, when the points of the leads are touched to the center and left-hand terminals of the coil, there is a light, it indicates that the condenser is short-circuited.

In order to replace the condenser, it is necessary to remove the base of the coil. First, scratch off the paint from the edge of the coil base and drive the small pins into the coil. They will lodge in the compound and can be removed easily for re-use; then take off the cover and unsolder the condenser lead—the new condenser is replaced in the reverse procedure.

Referring to Fig. 1, which shows the various circuits of the car, it will be noted that the battery has three cells which give a total of six volts. The negative side of the battery is grounded, while the positive is connected to the starter switch. Another wire connects the other side of the starter switch to the starting motor.

When the starter button is depressed, current leaves the battery at the positive side, flows through the starting switch, through the fields of the starting motor, then through the armature and to the ground, returning to the grounded side of the battery. This flow of current causes the armature to start to spin. When this happens, the Bendix gear is threaded into mesh with the fly-wheel gear, thus cranking the engine.

From the battery side of the starter switch is connected a small wire that leads to the ammeter. From the other terminal of the ammeter, a wire runs to the cutout which is mounted on the right-hand dash

support; the cutout closes the circuit between the generator and the battery, when the generator is producing sufficient current to charge the battery. Another wire connects to this same side of the ammeter, this wire which leads to the ignition switch.

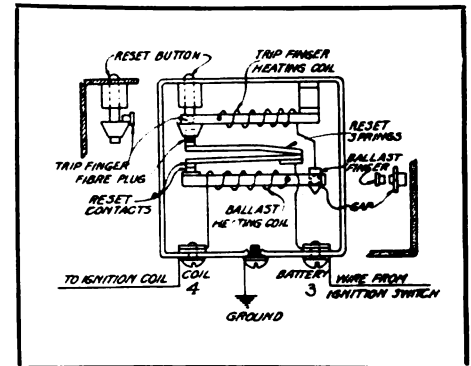


Fig. 4. Circuit Breaker, Connecticut Ignition.

A wire from the ignition switch also goes to the horn-and-light fuse. The lighting system provides for dim and bright headlights. When the lighting button is pulled out, the headlights burn brightly. When the button is pushed all the way in, the lights burn dimly. When the button is in a mid-way position, all lights are off.

The dash and tail-light are on when either the dim or bright lights are used. These lights are connected in series so that, when the tail light goes out, the cowl light will also go out, warning the driver of the extinguishing of the tail-light. As these two bulbs are in series, it is necessary to use a 3-4-volt, double-contact, 2-candle-power bulb in the dash and a 2-candle-power, single-contact, 3-4-volt bulb in the tail light.

In order to easily locate starter trouble, the starting circuit must be known. This circuit is indicated in Fig. 1 by the heavy arrows. The current, after leaving the battery, goes to the starter switch and to the starting motor. There it divides, one-

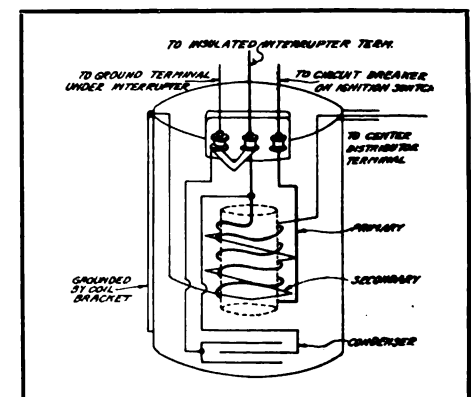


Fig. 5. Condenser Connected to Two Left-hand Coil Terminals.

half of it going through two field poles and the other half going through the opposite pair. All of the current then enters the armature through two opposite brushes and leaves the armature to the other two brushes

to the ground, returning to the negative side of the battery.

If the starter is not working properly, it is best to turn on the lights when looking for the trouble. If, for instance, the lights go out when the starter button is depressed,

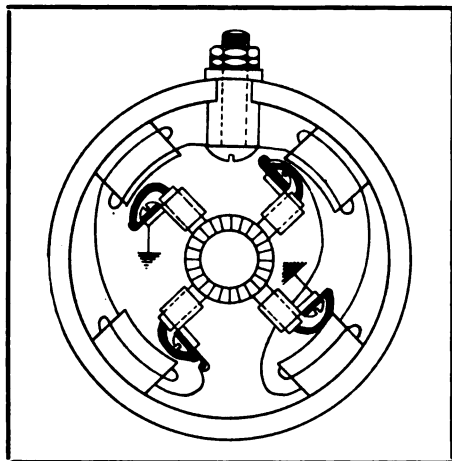


Fig. 6. View of Autolite Starting Motor From Commutator End.

it indicates that the trouble is due to an insufficient amount of current going to the starter. This is generally caused by a dead or weak battery, although a heavy ground between the starter button and the motor can also affect the starter in the same way.

If the lights go out, a test of the battery should be made and, if it proves to be O. K., a test should then be made of the circuit for a short. Nine times out of ten the short will show up by smoking, as it would take a very heavy short to make the lights go out. If the lights are not affected when the starter pedal is operating, it indicates that there is an open circuit some place in the starting system.

An open circuit will generally occur either at the starter button or between the brushes and the commutator. If the brushes stick in the brush holders, or if the commutator is burned, it will often be open-circuited. Remove the starter and cover and inspect the brushes. See that they are making contact.

An excellent way to determine whether the trouble is in the starter button or in the starter is to short circuit the starter terminal to the frame or some metallic part of the car while the starter button is depressed.

If there is a circuit, it indicates the trouble is in the starting motor. If there is no circuit, it indicates that it is between the starting motor and the battery, generally at the starting switch. If the commutator is badly burned and worn, it is best to remove the commutator and undercut the mica.

If, when the lights are turned on, they burn rather dimly and when the starting button is depressed, a poor connection at the battery should be looked for. If the terminals are corroded, they should be re-

moved, thoroughly cleaned and replaced after covering them with cup grease. The grease will prevent further corrosion.

If conditions indicate that the battery is defective, a hydrometer or voltmeter reading should be taken of each cell. A voltmeter reading of 1.6 to 2 volts should be secured. If any cell happens to show no voltage, or a slightly reversed voltage, it indicates that the cell is dead or shorted. Naturally it should be removed and repaired.

If the battery seems to be all right, a discharge reading of the starting circuit should be taken. There are high reading ammeters on the market designed for this purpose. They can be placed directly under the starting cable and a very accurate reading produced. This system should draw at least 125 amperes when cranking a motor that is not unusually stiff. If a greater ampere draw is obtained, it means there is a short circuit some place in the starting circuit.

In case it is necessary to remove the starting motor, it can be accomplished by loosening the part at the left side of the engine and dropping it at the rear only. Then remove the three cap-screws that hold the motor to the engine. A No. 25 end-wrench will fit these cap-screws. The motor can then be lowered and removed from the bottom of the car. The starter should be taken apart and carefully inspected.

All parts should be thoroughly washed and cleaned and the condition of the commutator, brushes, brush holders and wire carefully noted. If a wire is noticed with the insulation worn through, this should be repaired and the starter given a thorough cleaning before assembling for a test. Look at the field coils to see that the armature has not been rubbing against them, wearing off the insulation and short-circuiting the turns.

The windings on the field coil are often rubbed so much that the wire will become shorted with the field pole. In order to determine this, it is only necessary to remove the brushes and test the field circuit with a 6-volt battery.

Place one lead of the battery on the starter terminal and the other lead on the ground. If a flow of current is obtained, it indicates that one of the fields are grounded. To locate this, leave the connection stand and watch for smoke, or a hot place in one of the coils.

After the short-circuit is discovered, it sometimes can be remedied by placing a piece of insulating cloth between the coil and pole piece. However, it is best to re-

move the coil and retape. After the old tape has been removed, if the coil seems to be very badly worn, it is best to install a new coil. The illustration, Fig. 6, will greatly assist in tracing the circuits of the motor, as both the internal field connections and external appearances of the machine are shown.

If trouble is had in the generator, it can best be located by operating the cut-out points by hand. The cut-out, shown in Fig. 7, is on the right side of the car, under the hood mounted on the right-hand dash support. By removing the cover, the points can easily be operated by hand. First, hold the points together, watching the ammeter on the dash while so doing. If the generator is in good condition, the discharge current that flows through the cutout to the generator will be between 15 and 20 amperes. Of course, the engine is not running. If there is no current flowing, it indicates that there is an open circuit between the battery and the generator.

It is best to make a test from the generator terminal and the ground with a voltmeter or ammeter, or a screwdriver can be shorted across the terminal to the ground. If this shows a current flow, it indicates the trouble is in the generator.

The brushes and commutator should be inspected the same as previously described in the case of the starter. If everything seems to be all right, it is best to remove the generator, take it apart and inspect the parts carefully.

Generator trouble is often found in the armature. If, when the cutout points are held together, there is a current flow of only two or three amperes, it indicates that the field circuit is all right but there is no armature circuit. When a normal discharge current of 15 or 20 amperes is obtained, the engine should be started and the output of the generator carefully observed. The output should go up to between 10 and 15 am-

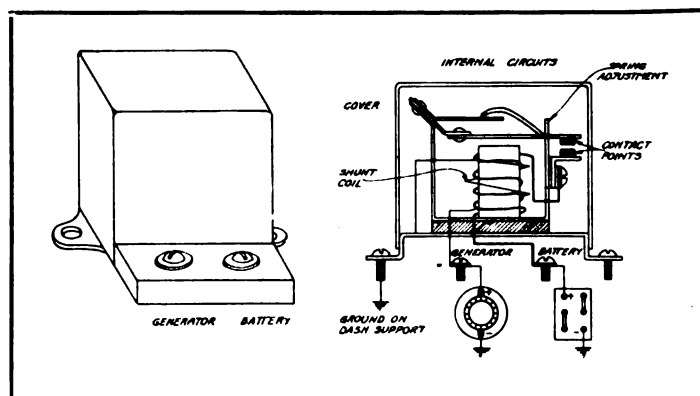


Fig. 7. Outside View Generator Battery and Diagram of Internal Circuits.

peres on the charge side very rapidly after the cutout points close. If, on the other hand, the current comes up to zero on the ammeter but does not rise to the charge side, it generally indicates a short-circuited armature. High micas or a commutator badly burnt may have the same effect.

If the generator charges when the cutout points are held together, but does not charge without holding the points together, it generally points to trouble in the cutout.

Sometimes, however, dirty brushes or poor field connections will produce the same results. The external connections of the cutout are shown in Fig. 7. The generator and battery are also shown connected in their relative positions.

In order to make a test of the cutout, it is best to use a voltmeter. The engine should first be started and the throttle opened so that it will operate at about medium speed. The voltage should be taken at the generator terminal, with one wire on the frame of the car.

If this voltage proves to be six or above, a reading should then be taken between the frame of the cutout and the generator terminal. If no voltage is obtained, it indicates a break in the wire between the generator and the cutout, or that the cutout is not making a good ground connection on the dash support.

If a voltage is present across the generator terminal and the cutout frame, the points should close as the engine speed increases. If it does not do this, it indicates that the fine winding on the cutout is open or that the spring adjustment on the cutout points is too stiff.

To make an accurate test of the fine winding, the generator wire leading to the cutout should be removed and a voltmeter connected to this wire and the terminal from which it was removed. If there is no voltage reading at this point, a new cutout should be installed, as it is quite an expensive job to rewind the voltage winding. If, in order to repair the trouble on the generator, it is necessary to remove it, care must be taken to see that the timing of the engine is carefully marked so that extra

retiming. It is not necessary to have this set absolutely the same when the generator is installed, as the distributor can be lifted out of the generator end casting by loosening the two screws just under the distributor head, which hold a collar clamp around the distributor post. This can be lifted out and the distributor brush set in the proper position, then dropped into the distributor bracket and the clamp tightened.

If it is necessary to recheck the timing, it can easily be done by turning the engine until piston No. 1 is on upper dead center after the inlet valve has closed. The distributor brush should then be turned so that it is under the segment that connects to the wire leading to No. 1 spark-plug. The brush should then be moved carefully in the direction of rotation until the points just start to open. Be sure that the ignition lever is in a fully retarded position.

In order to take apart the generator, the screws should be removed from the brush holders and the long bolts, having a flister head, should be taken out. These bolts are shown in Fig. 8. The ignition-drive bracket can then be easily removed; also the end bracket.

The internal circuits of the generator are also shown in Fig. 9, where the view is from the commutator end. The brushes are in their normal position. The brushes at the bottom of the generator are the main ones, while the upper brush is the shunt or third brush used to control the output of the generator.

After the parts have been thoroughly cleaned, they should be tested for opens, shorts and grounds, especially the armature. If the brushes are worn badly, a new set should be installed and the generator reassembled.

Before the third brush is placed in position on the commutator, it is well to set the main brushes in the proper position. To do this, connect the generator to a battery so that current will be flowing to the armature only. In other words, one side of the battery should be connected to the ground of the generator and the other side to the generator terminal.

If the main brushes are in the neutral plane, the armature will not have a tendency to turn, but if they are out of the neutral plane there will be a tendency for the armature to turn either in one way or the other. The best position for these brushes is such a position that there will be only a slight tendency to rotate the armature in the same direction in which it is driven.

After the main brushes are set, the third brush can be adjusted so that the output of the generator will be approximately 10 amperes. It is best to make this adjustment with the generator on a test bench. If the output is too low, the third brush should be moved in the direction of rotation. If too high, move in the opposite direction.

Before moving the third brush, it is necessary to loosen the locknut shown in Fig. 8.

After the adjustment is made, it should be tightened before the output reading is taken. The trouble in the lighting circuit can generally be located very quickly if the circuits are once thoroughly understood.

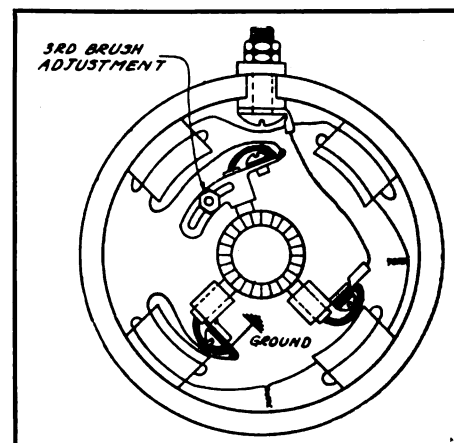


Fig. 9. Internal Circuit View From Commutator End.

Fig. 1 shows the various lighting circuits, they being indicated by the three arrows. The detail of the lighting and ignition switch are shown in Fig. 3. Both the front and rear view of the switch are shown, together with the lettering on it. If there is no circuit in any of the lights, the fuse should be inspected. This fuse is located under the cowl board under the left-hand, cowl-board support. If the fuse is all right, the bulbs should be examined to make sure they are not burned out.

Sometimes all of the bulbs will burn out, due to a loose connection between the generator and the battery. If the bulbs are O. K., tests should be made between various terminals on the lighting switch and the wires at the lamps.

HOW DO YOU HANDLE CREDIT METHODS?

(Concluded from Page 24)

most needed it, he should dig around and get the money when you need it.

Simply ask him to pay, don't try to scare the customer by telling him you are going to use the law, etc., for, if you do, he may get on his high horse and refuse flatly to do anything. If the bill is small, or if your chances are poor to get it, it's a nine-to-one shot you'll lose the account. If the account is small, it will not pay to sue for it and the customer knows this just as well as you do.

Therefore, the best plan is to make a peaceable settlement and retain the good will of the customer, even though he never comes into your place again.

When a customer has an account with you and comes in for more goods, and you know he is going to ask to have it charged, before he has time to say "charge it," ask: "Will you pay for this now?" And many times he will pay, when he had his mouth all twisted up to ask you to charge it. "Ask 'Em To Buy"—then "Ask 'Em To Pay."

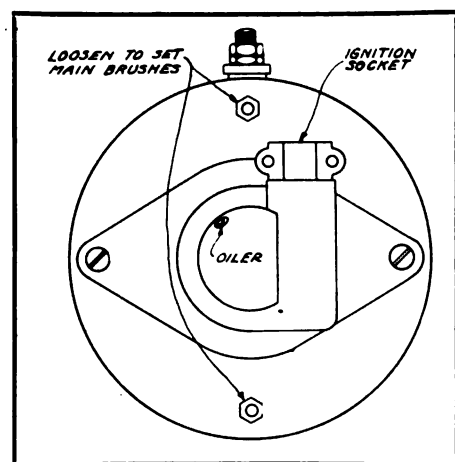


Fig. 8. Ignition Mounting and Main Brush Adjustment.

time will not be consumed in retiming the ignition.

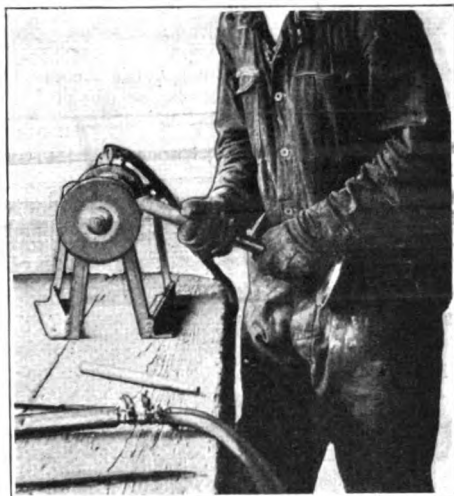
Fig. 2 shows a method of marking the position of the distributor brush so that, when the generator is replaced, it can be set in the same position, thus eliminating

Welding, Cutting and Brazing Practice

An Entirely Successful Welding Job Possible Only When Weld Has Been Properly Prepared — Cleanliness an Important Factor — Preparation of Torch and Attention to the Incidentals for Completion of Weld Essential

By David Baxter

A certain amount of preparation is essential to the entire success of nearly all oxy-acetylene welding jobs, whether large or small. In fact, it is absolutely mandatory on some classes of work. In any event,



Operator Beveling the Part Which is to Be Welded.

a casting well prepared is also half welded.

Although it is true that many welders slight this important consideration on a great deal of their work and seem to obtain satisfactory results, it is also a fact that such welding is not entirely satisfactory in comparison with scientifically welded jobs.

Some classes of welding need more careful preparation than others, and sometimes circumstances force the welder to make the weld without properly preparing it.



Preparing the Weld by Cutting the Groove With Hammer and Chisel.

As a rule, every job should and can be prepared to some extent previous to welding, this saving a lot of time and trouble later. No matter how insignificant and how cheap the job is, a conscientious welder will take all possible steps to secure a perfect weld.

Perhaps it would be more correct to say that the job should be prepared for preheating instead of prepared for welding, since many of the jobs require preheating before welding—we could count the preheating a part of the preparation which, in a sense, is true. Some jobs, however, do not need any heating previous to applying the welding flame.

We will not attempt to discuss the subject in general but will confine ourselves to the garage or automotive repairshop, considering there the little things that facilitate the welding and make better welds.

Probably the most important of these is cleanliness. The line of welding—that is, in most cases, the fracture or crack—should always be cleaned of all foreign substance before the weld is started and before the actual fusion is commenced. Both upper and lower, on inside and outside, should be cleaned where it is possible to reach both.

Take, for instance, the water jacket of an automobile engine cylinder. Unless a part is broken entirely out of the casting, it is practically impossible to clean both surfaces of the metal. If a part is broken out, the welder should reach under the edge and scrape the under side for an inch or so back from the crack, making it as clean as possible. If the jacket is merely cracked, he should tap along this crack with a light hammer to loosen the corrosion scale and cause it to fall away from the under side of the weld.

In any event, the surface of the casting for an inch or so on each side of the fracture should be cleaned of all rust, paint, dirt, or other foreign substance. The metal here should be bright and clean before commencing the fusion process.

It matters but little how the cleaning is done. The substance may be washed off or scraped away with a file, or may be cut loose with a chisel. If a file or chisel is employed, the foreign matter will be more easily removed by first burning the stuff to a cinder with the welding flame. Sometimes it is convenient to wait and scrape the matter off after it has burned in the preheater. On small jobs the surface may be ground bright and clear on an emery grinder.

The purpose of this cleaning is to prevent any chance of a substance detrimental

to the weld entering the weld, either in solid or gaseous form. Such is likely to be the case where rust or dirt grease is allowed to remain along the fracture. The bits of foreign matter may cause more pin-



Small Castings Are Conveniently Grooved on Emery Wheel.

holes or spongy spots in the weld than any other one thing. They enter the molten weld and cause a slag formation to be hidden in the weld if it is not floated or scraped away, or they enter the weld to burn in the intense heat of the flame and form a gas pocket.

Sometimes this tiny explosion finds an exit through the metal and leaves a minute crater which is called a pinhole. If the weld metal is hot enough and sufficiently fluid to flow together again after the gas



Groove in Heavy Steel Casting Is Handily Made With Cutting Torch.

pocket escapes, the pinhole will be closed up, but if the metal is sluggish the tiny crater remains open.

The molten condition also has a lot to do with the removal of slag and gas pockets. It is difficult to float either one to the surface of the weld unless the metal is fluid. The defects are trapped in both if the metal is sluggish, to show up only when the weld is machined or ground.

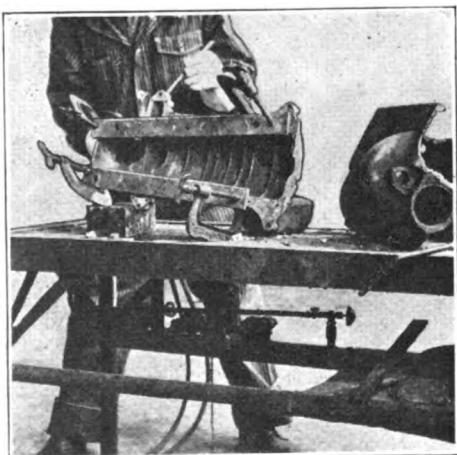
It should now be apparent to the beginner how essential it is to be cleanly. Even bits of asbestos paper or other dirt, dropping unnoticed into the weld groove during the heating or welding process, will often cause trouble later. These bits of foreign substance are detected during the welding by their intense brightness under the welding flame. Sometimes they burn up and are blown away before they can become entrapped in the weld.

Next to cleaning the line of welding, perhaps the most important step in preparing a job for welding is what is known as chamfering or V-grooving the fracture. In other words, the sides of the crack are cut away to form a wide V-shaped groove.

If two separate parts are to be welded, the edges are beveled so that they will form a wide groove when fitted together. The metal removed should be approximately the same on each part to secure a well balanced weld. But sometimes, when welding castings, it is necessary to remove all of the groove metal from one side of the fracture. This is a fact which the welder should take into consideration when he applies the filler metal.

This grooving is accomplished in many ways. Usually it must suit the condition of the job and the equipment of the shop. In many cases it is cut out with hammer and chisel, but there is some danger of enlarging the fracture by this method. A handy device is a portable, and even a stationary, emery grinder. On castings that are small and easily handled, the groove is readily cut on the corner of the emery wheel.

In most cases the groove should extend almost through the metal—at least to a



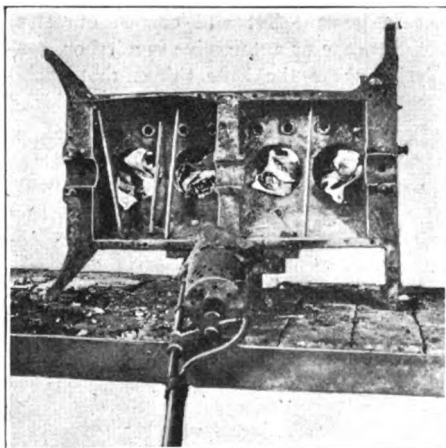
Aluminum Castings Are Braced In Order to Hold Alignment.

very thin edge at the bottom. For metal an inch or less in thickness, the width of the groove at the top should approximate twice the thickness of the metal.

For heavier metal it is scarcely practicable to use these measurements, however, on account of the labor involved in removing so much material, even if it were absolutely necessary, unless the weld is to be made in cast steel or other steel. In that event, the parts may be beveled or the fracture grooved with the cutting torch. Enough metal must be removed to permit a free handling of the flame at the bottom of the groove—especially on thick jobs—when the welding starts.

The purpose of this grooving is manyfold. One, and perhaps the chief reason, is that the groove permits the welder to fuse the full thickness of the metal without risk of poorly connected spots in the weld. The fusion is accomplished more rapidly, thus eliminating the chance of burning the metal so much, as is the case where a deep weld is made without grooving.

Another reason for grooving is that there



The Broken Sides of the Casting Are Braced Before Preheating This Job.

is more room for carrying out the fusion, and the operator can see at all times just what is happening in the weld. If he welds without grooving, a good part of the fusion is guesswork.

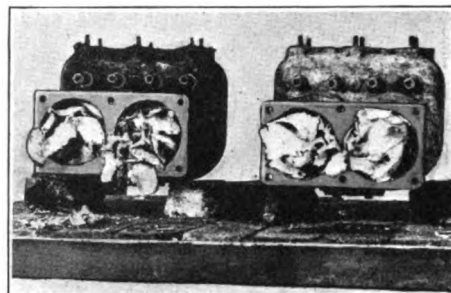
In short, the grooved weld has a better chance of being a good, sound bond than the one made without beveling.

The illustration should clearly explain the points made here, so we will now pass to another important item in the list of welding preparations.

Take the matter of keeping the casting or its parts in alignment. Aluminum castings, especially, are subject to distortion and sagging when heated. Crankcases, housings, transmission cases, and the like, will often be out of line when the weld is finished, a great deal of which is due to the sagging of suspended parts when heating.

All parts of the casting that are liable to sag should be supported in some way before the preheating starts. It is often found well to brace the edges of an alumi-

num crankcase, with bars of flat iron clamped rigidly in place along the flange. These bars strengthen the casting and tend to keep it from sagging as the heat increases. The torch operator should look the job over and prepare for this emer-



Cylinder Bores Are Filled With Asbestos Paper to Protect Their Polish During the Preheating.

gency before he starts to operate the preheater.

It is the custom in some welding shops to take the average casting to be welded and place it on the preheater without paying any attention to cleaning, grooving, clamping or bracing. Then, as soon as the casting gets hot, the flame is applied and the weld is completed. But it is not perfect—it cannot be—although it looks all right to the customer, who probably knows nothing about welding. If it happens that the weld has to be machined for a clean snug fit, the imperfections of this haphazard method will be glaringly apparent even to a "greenhorn."

A job that is not prepared for welding may get by the inspector but it is liable to fail in service, while the weld that is scientifically prepared and welded has a far greater chance of being a perfect job. That is self-evident.

Now, a word in closing this chapter. There are many other ways of making preparation for welding besides preparing the job, and which are almost as important. One of these is to prepare the torch and to see that it has the proper tip and correct adjustment of the regulator valves. If these items are wrong, an otherwise well prepared job may be ruined in the welding.

See that there is a sufficient supply of gas and other incidentals to complete a weld, once it is started. Some jobs must be all welded in one sitting or they are defective.

The proper flux and filler metals should always be ready before the fusion is commenced, and they should be conveniently arranged for use when they are needed for a job of welding.

It is better to be prepared, any day, than to trust to luck. The fellow who trusts to luck nearly always finds he has the wrong kind of luck. So, in order to keep the customers coming, the thoughtful welder will be willing to do everything possible to insure the weld and lower its cost to the minimum.

Glimpses in the Garageman's World

Pennsylvania Service Station Demonstrates the Fact That the Smallest of Stations May Give First-Class Service—Utilizes Roof For Signboard and Thus Adds to Its Revenue—A Notable San Francisco Battery Station

A garage or wayside service station may be ever so humble in its appearance and yet be the workshop where unusual inventive power produces something worth while in the mechanic's field. Such a place is the little Brookside Service Station of Ye adon borough, Delaware county, Pa.

Here automobiles, trucks and electric batteries are repaired and accessories, gasoline and oil sold. Its machine-shop is suitably equipped with a large drill press, tools and benches.

As a means of revenue, the sharp angled roof is rented as a signboard to tire and other concerns in the automotive line, for so much per quarter or other period that will pay. Just now it is rented to a tire concern and the slant of the roof permits the huge white lettering on either side to flare its message over a distance equal to several city blocks.

But in the rear of the shop is the magnum opus of A. P. Huggins, the proprietor of this independent service station.

This is a universal connecting-rod bearing scraper, which lines up the piston with the cylinder walls and scrapes the bearing in 15 minutes, as against the laborious hand method which ordinarily takes anywhere from four to eight hours for a first-class job.

And this device does not ream; it scrapes the bearing, being applicable to bearings of any size whatever. In fact, it performs three operations, as follows:

Scraping the bearing.

Scraping the bevel.

Scraping the side.

One of the most important parts of the mechanism is the gage, which lines up the piston with the cylinder walls. This is a casting 12 ins. by 6 ins., bolted and pinned to the machine's base so as to be immovable, on a right angle with the scraping shaft.

The shaft in which the scraper is fastened is fed by a screw feed. There are two gears at each end of the scraping shaft, which revolves at the rate of 128 revolutions to the inch to whatever distance may be the width of the bearing.

A hand feed is used to scrape the sides of the bearing. As it is fed, the screw takes up the shaft.

The scrapers themselves are made of steel rounds 5/16-inch in diameter, with a good scraping edge, and range in length from 1¼-ins. to two inches.

Only one scraper is used at a time, the

surpass all in the matter of automobile service at least. The Democratic national convention brought quite a number of men, interested in battery service to San Francisco. Some of their leisure time, naturally,

was devoted to a study of conditions in their lines of business.

Without hesitation and without exception they agreed that battery service in San Francisco was the best they ever saw, or even thought possible. Even the smallest of the stations there were better and larger than the best in the East.

One service station, handling Prest-O-Lite batteries and operated by Earl Cooper, the former racing driver, is said to be the largest, lightest and best equipped

in the world. The floor area is 11,645 square feet, allowing service space for 50 cars at one time. There is not a pillar or a post to cause any backing up and, as there is both an entrance and an exit, it is simply a case of driving in and driving out after the customary test.

Tipping is forbidden, and a pleasant atmosphere is ever present, due to the un-failing courtesy of the employees. A generous arrangement of roof lights makes the most remote corner of the interior as bright as day.

Painted from top to bottom in pure white, and with the generous roof lights, the station seems typical of Californian



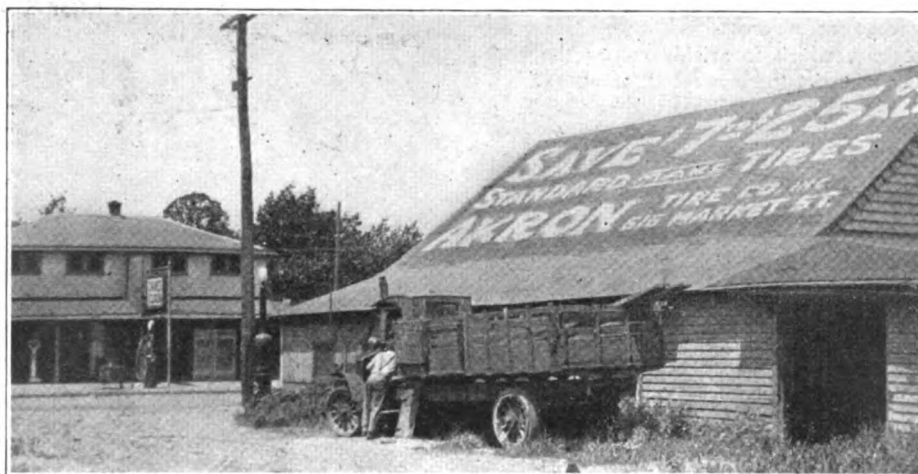
Brookside Service Station, at Ye adon borough, Pa., Small in Size, Big in Service.

handle of the shaft being revolved by the operator. There are three holes in the shaft that turns the scraper, so the scraping tool may be set at a distance which varies according to the bearing to be scraped.

The scraping tool is slipped into one of these holes and fastened firmly therein by means of a set-screw. A micrometer is used to do the setting. The tools are set by noting the size of the crankshaft and taking half its diameter.

West a Leader in Battery Service.

As the Eastern states of America excel Europe in service of all kinds, it is now contended that the Pacific Coast states



Slant of Roof of Brookside Station Permits Its Use for a Signboard.

sunshine, and the equipment is the last word in up-to-date efficiency.

The batteries are shipped from the East in carload lots in a dry state and do not receive the acid and first charge until actually sold to the customer, which insures the customer's receiving a strictly new battery, instead of one that possibly has been months in transit and perhaps longer on the shelf waiting for a purchaser.

A comfortable and cosy wicker-furnished waiting-room is maintained for women. They patronize the station regularly for this reason, and because it is so centrally located and so easy of entrance and egress.

A card follow-up system is maintained, and when Prest-O-Lite users do not come in regularly for their tests, they are written to and reminded of it. The result is a satisfied clientele that grows because it is satisfied. Cooper is instituting a campaign of advertising, consisting of a combination of newspaper advertising, circular letters and highway bulletin boards.

The Prest-O-Lite advertisements are especially prepared for California and feature the Green Seal batteries. A pointed argument in these advertisements is the fact that the batteries are shipped west in carlots in dry state, as mentioned.

In the interior view, *A* and *B* show the repairshop and charging rack.

The Farmer and the Garage.

These are the days of co-operation of widely varied industries—more, without doubt, than at any previous time, and just now, as a consequence, many farmers are looking with no little interest to the possibilities of such co-operation with the nearest cross-road garage.

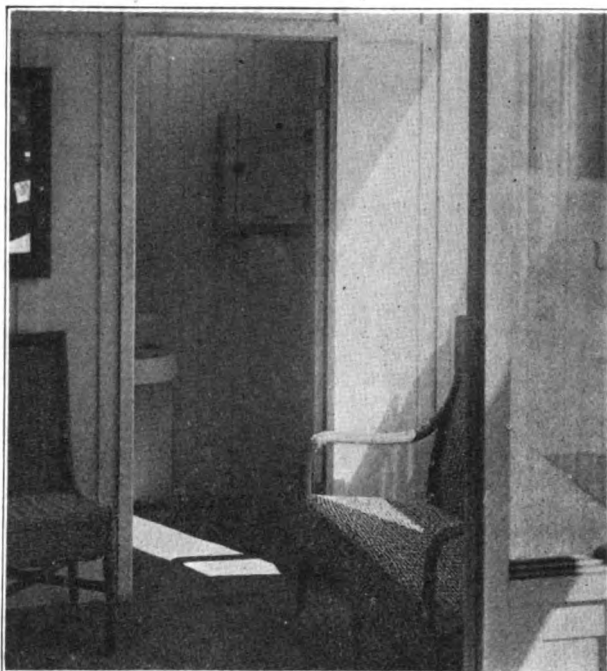
There is something about an isolated garage at a cross-road, away from the centers, which invariably causes the passing motorist to slow speed, or else stop.

It's a sort of last Ultima Thule of safety,—the last possible chance in many miles to get this, that, or the other thing he may need. He stops, if but to make mental review of what he just possibly may need, and meanwhile his eye settles on some accessory, or a call for overhauling which the garageman may have posted.

Suppose, however, that, along with the accessories and other things exposed in the windows, there is a neat sign giving the prices of these—prices which are infinitely lower than one may buy such articles for in the city—and then a neat array of fresh-laid eggs. Suppose there are pyramids of tomatoes, big, ready-filled baskets of

apples or potatoes or containers of peaches, plums or pears?

Suppose there are any other of the many things farmer folks might bring—packed and ready to take—to such a garage, and



Comfortably Furnished Waiting Room of Cooper Battery

arrange to leave there upon consignment.

Along come Mr. and Mrs. City Folk. They are a bit motor-weary; their throats are dry with the roadside dust. They are just a little hungry, and yet it isn't meal-time. Their eyes have been taken by the sign of the garage in the distance and, for reasons already stated, are most alert.

Of a sudden, they come full upon the window of the garage. The next instant both have sighted the fruit, the vegetables, or whatever it may be, interspersing the automobile supplies that are displayed there.

There is magic in the words: "Fresh Country" Along with them, any price seems right.

The motorists stop, dismount, and are inside instantly. They buy this, that, or the other bit of country produce exposed here. Naturally, the farmer who has his wares on sale thus makes prices to pay the garageman rent, and a neat share for the actual sales beside.

More than that, though, things do not stop here, for the automotive dealer. The country produce is displayed here and there about the shop, with accessories of every sort interspersed. The motorist sees the eggs and the butter—they catch his eye because so out-of-the-ordinary there. Among these, and thereby emphasized the more, the tires, tubes, jacks, and other motor accessories appear.

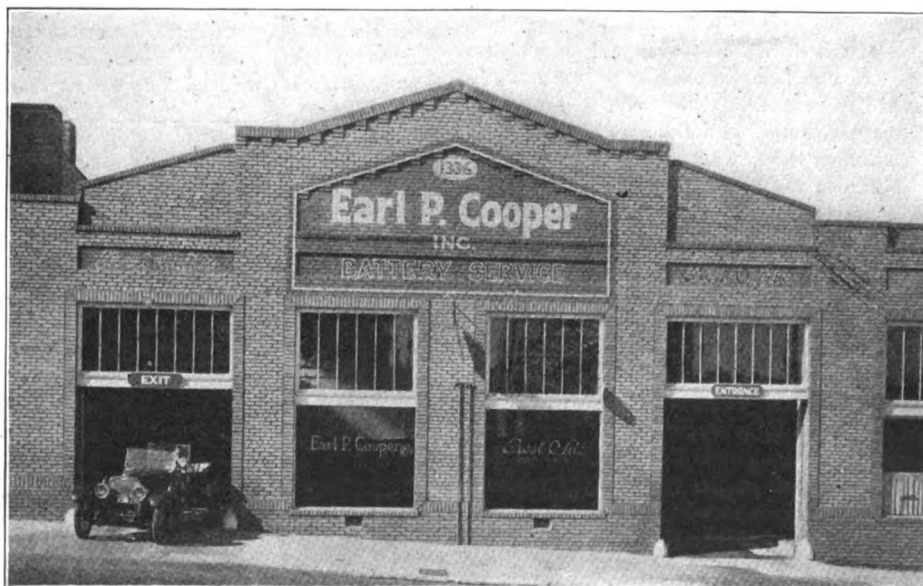
The motorist buys the country produce he has come in for, and that he would never otherwise have inquired for at any neighborhood farm. And, while buying these, he buys whatsoever he may possibly have need or use for in the line of motor accessories and automobile supplies.

Recent Cut in Gasolene Price Saves Motorists \$73,500,000.

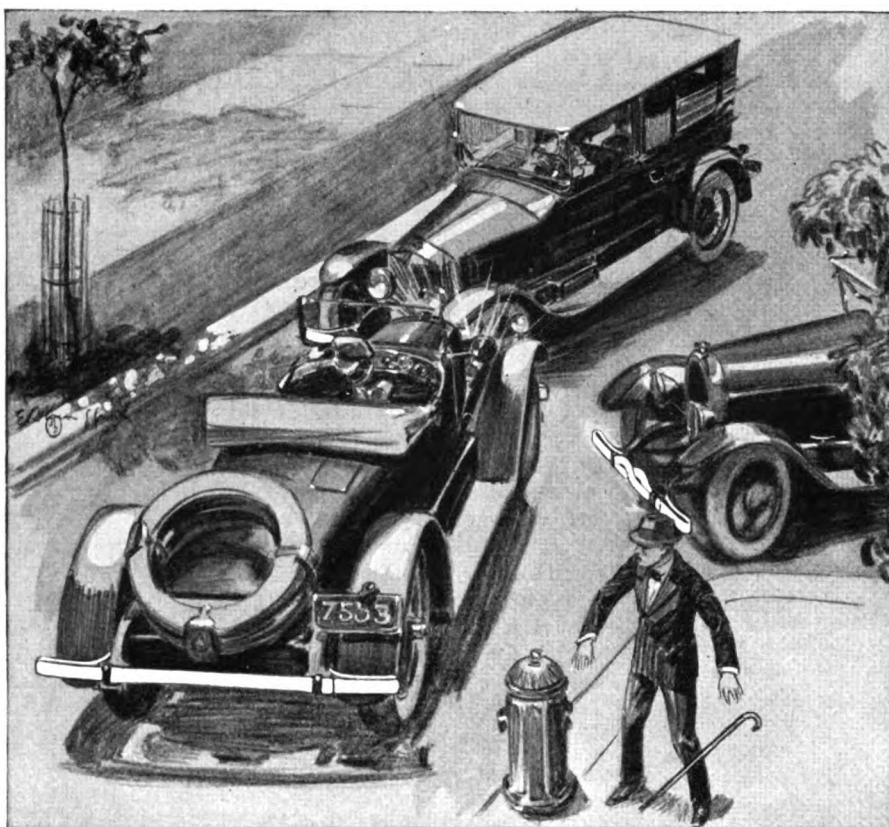
Motorists of the United States are more than \$73,000,000 richer as a result of the recent 2-cent cut in the price of gasolene.

Estimates of fuel consumption per motor vehicle range from 350 to 450 gallons annually. Taking the former figure, which was estimated from U. S. Bureau of Mines' reports on total domestic consumption, the saving to each motorist on a 2-cent cut is \$7 annually, and to the motoring public which numbers 10½ million, the saving is \$73,500,000.

A reduction in gasolene prices is particularly beneficial to the farmer who owns one-half of the motor cars and 2,000,000 gasolene-consuming stationary engines.



This San Francisco Battery Station Called Largest, Lightest and Best-Equipped In World.



Careless Driver Cuts Corner—Crash!

CAR shoots out of side street! Driver on highway is too late to stop! A quick turn to the left—then, *crash* into the car coming in the opposite direction. But neither car is damaged. Both were Lyon-protected.

It's the all-spring steel construction that makes Lyon Spring Bumpers so resilient—and so desirable! When struck, the Lyon-patented two-piece overlapping front bars and the open "looped-ends" absorb the shock completely instead of passing it on to the frame.

Lyon Spring Bumpers are guaranteed to take the full force of any blow at the rate

Over a million in use. Retail prices, \$10 to \$25.

of fifteen miles an hour without injury to the car or its occupants. Then, too, insurance companies grant reduced rates on Lyon-protected cars. This saving, when pointed out to a prospect, is very convincing "selling talk."

Lyon Spring Bumpers are beautifully finished, remarkably strong and perfectly balanced. More of them are sold than all the others put together. Isn't this conclusive proof that they are one of the most profitable accessories you could handle? They can be quickly attached without drilling or altering the frame by the use of the Lyon-patented hook-bolt.

METAL STAMPING COMPANY, Long Island City, New York

Dealers: Our bumpers are manufactured under basic Lyon patents. No other bumper is like them; none can be like them.

Jobbers: If your stock doesn't include Lyon Bumpers, write to us; our proposition will benefit both of us—it is fair and square.



Lyon Straight Bar Bumper



Lyon Convex Bumper

LYON

RESILIENT BUMPERS

Practical Hints for Shop Mechanics

Removing Ford Cylinder Head.

When removing the cylinder head of a Ford, it is necessary to have some means to keep the two back bolts from dropping down when the head comes up. This also may occur when replacing it.

When the head is free of the cylinder block, use a piece of a 3-inch inner tube, cut from an old tube, about $\frac{3}{4}$ -inch wide.

Just snap it around the two back bolts. This will hold them very well. They will remain in this manner until the rubber band is taken off.—G. F. H., N. C.

* * *

Fender Straightening Tool.

The most common and one of the most difficult fender repair jobs is caused by bending the front of the fender down. Frequently it is hard to secure a hold on the fender with an ordinary tool which will enable one to straighten it up into place.

A very handy tool for such jobs can be made from a two-by-four, two blocks and a piece of board. One block should be bolted between the two-by-four strip and the board, thus forming a sort of hook somewhat similar to the hook you may have seen on the formerly familiar cistern poles.

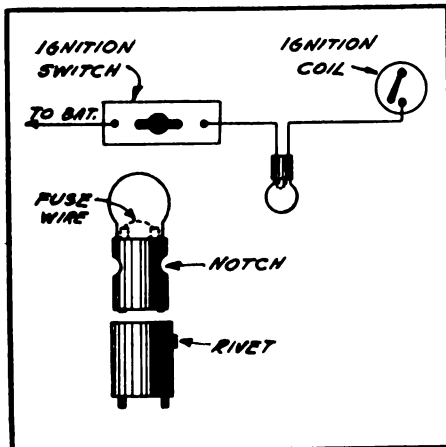
Another block, one face of which has been curved to conform to the curve of the fender, is used beneath the two-by-four strip, to act as a pivot or fulcrum when the hook end is caught under the edge of the fender. Used in this way it is very easy to straighten out a bent fender.

This tool does a quick, neat job, and will pay for itself on the first job.—E. R., Neb.

* * *

Secret Ignition Lock.

An ordinary double-contact dash socket and a double-contact plug are inserted in series in the ignition circuit, as illustrated. A piece of fuse wire is placed across the



Removing the Plug Locks Ignition.

two terminals of the plug, forming a circuit through the plug.

The socket is drilled and a small rivet placed as shown in the illustration. Notches

ONE DOLLAR EACH!
Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

are cut in the plug to correspond with the rivet head. Thus, an ordinary plug will not work in this socket. Removing the plug locks the ignition.—P. A. B., Pa.

* * *

Straightening Bent Rims.

The small garage is called upon to fix everything, from a balky generator to a lost cotter pin, so the following kink on flattened rims may not be amiss:

Running on the rim seems to be a popular sport with some motorists, and the repairman is often called upon to open up a badly flattened rim of the clincher type.

A small punch is convenient if the rim is badly flattened. Start the small end of this under the edge and drive it around the rim. This will open up the rim somewhat but not enough to allow a tire to be placed without damage. A small pipe wrench is best to open the rim wider. Catch the edge with the outer jaw of the wrench and press down over the rim. This will pry the edge out. Continue around the rim and smooth up the job with a file and emery cloth.—L. R. B., Iowa.

* * *

Stock Containers for Small Parts.

Many ideas have been presented for the arrangement and storing of small parts, but I encountered an idea the other day that is worth passing on.

Everyone knows that there are a multitude of small parts connected with a shop that renders electrical service, and to keep those parts where they can be found is somewhat of a problem.

In the electrical department of the garage of which I speak, the service man has arranged his stock of small parts—such as

brushes, special screws and clips of various sizes in small jelly glasses. These are ranged side by side on the shelf and each has a paster bearing the part number that can be found in the glass.

If the service man knows the part by sight, he can tell at a glance which glass to take down and, if he does not, he has only to refer to the labels. It is a simple matter to inventory and keep the stock from becoming depleted when parts are stored in this way.—B. L., Mass.

* * *

Adjustable Tire Hanger.

It is very hard to inspect the inside of a casing or to repair inside reinforcements unless a way is provided.

A very convenient tire hanger can be made for the repairman to use in making these repairs, with the aid of a few pipe tools and a piece of gas pipe about three feet long, a rod 25 inches long and an old flywheel from an automobile.

The flywheel serves as a base for the hanger into which the pipe fits. The pipe can be threaded and locknuts screwed on the upper and under sides of the base to serve as a lock.

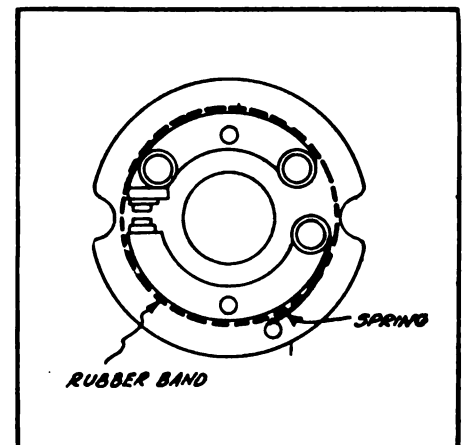
The rod must be smaller than the pipe in order to fit on the inside, and is bent into a shape at one end to hold the casing. At the top of the pipe a hole is drilled and tapped and a set screw inserted so that the repairman may adjust the rod to hold the tire at any desired height.—H. J. W., Iowa.

* * *

Repair for Broken Spring.

Here is an idea that I have worked out and it works pretty well.

If anyone has a car with a Connecticut distributor which has a broken tension spring, he can make a temporary repair by taking a rubber band and putting it around the brake-bar as illustrated.—H. S. V., Pa.



Place Rubber Band Around Brake-Bar.

Make Your Store the Most Talked of in Your Town

The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En-ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.

It is **not** given away.

It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

This service is supplied only to dealers who sell En-ar-co brands. The Boy and Slate Sign and every one of the epigrams are copyrighted.

There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

Write today for full particulars. Learn all about the Big En-ar-co Boy and Slate Sign, the epigram service, and the other advertising helps we give our dealers. Be the first in your community to get started. Use the Coupon. Use it **Now!**

THE NATIONAL REFINING COMPANY

National Headquarters, R-731 National Bldg., Cleveland, Ohio

4 Modern Refineries : 93 Branches

THE NATIONAL REFINING COMPANY.

R-731 National Building, Cleveland, Ohio

Without obligation to me please send full detailed information regarding the En-ar-co "Boy and Slate" and Epigram Service, and other advertising helps.

Name.....

Address.....

City..... State.....

I now sell..... Oil.



Ball Bearing Countershaft.

Old style, plain bearing countershafts often cause serious trouble. They are usually located in positions which render the proper attention—in the way of lubrication, etc.—somewhat difficult. There-

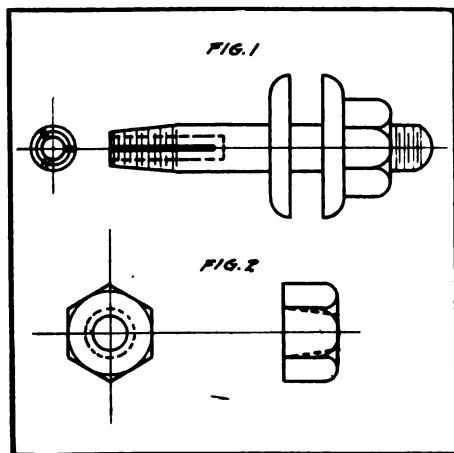


Fig. 1. Ordinary Malleable Iron Hub.
Fig. 2. Spokes Cut to Fit Hub.

fore, the bearings are sometimes allowed to run dry with consequent ill effects.

Modern shop practice has developed several styles of anti-friction, countershaft bearings which give splendid results. However, to the average small shop-owner, these are pretty expensive. Therefore, the writer is going to describe a ball-bearing countershaft, which was constructed from two old automobile front hubs, and which can easily be made in any shop which possesses an engine lathe.

Fig. 1 represents an ordinary malleable iron automobile hub. It will be noted that the back of the stationary flange, and the projecting portion of the hub beyond the flange, are turned and faced to receive the tight and loose pulleys.

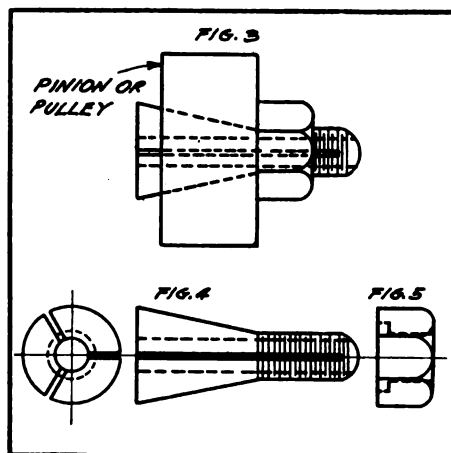
In this particular instance, use was made of two old-style flange pulleys, as used some years ago in threshing machine construction. The spokes were cut off to leave an opening nearly large enough to fit the turned portion of the hub. The casting was then chucked and the spoke ends turned to a snug fit upon the hub, the pulleys being fastened to the hubs by suitable machine screws running through the hub flange and into the flange of the pulley.

Fig. 2 illustrates the manner in which the spokes were cut off to fit the hub. Fig. 3 shows the manner in which the pulley was made to drive the grinder. Another pulley of suitable size was chosen, its spokes cut off, and the ends bored to fit the portion of the hub which formerly went through the spokes of the automobile wheel. To these spokes was secured one of the old loose flanges of the automobile hub. Clamp bolts through the old hub bolt-holes make a very satisfactory fastening. Two set-screws were fitted to the hub of the loose flange to secure the pulley.

The next portion of the job to be performed is the making of the shaft upon which to mount the hubs. This is made as shown in Fig. 4, in which the portion *D* represents the enlarged central portion of shaft between two stationary cones. *L C* represents the portion of the shaft turned for a force fit of the large stationary cones.

Portions of shaft, *S C*, represent the parts which are threaded to fit the adjusting cones and their locknuts. The portions of the shaft between the parts *L C* and *S C* are tapered in a similar manner to the same portions of automobile steering spindles. Beyond the portions, *S C*, are two plain portions of the shaft, *H H*, which are provided to fit suitable hangers.

Suitable means of retaining lubricating grease in the hubs should be provided. At the large end of the hubs there can be used the original felt washers to fit the large portion *D* of the shaft shown in Fig. 4. At the opposite end of the hubs, caps should be provided to screw on in a manner similar to the original hub caps, these caps being made as shown in Fig. 5, the large portion which screws upon the



Figs. 3, 4, 5. Pulley for Driving Grinders;
Shaft for Mounting Hubs and Caps.

hub having a solid end similar to a hub cap except that there is provided a suitable opening for the shaft.

There is also provided a felt retaining cap, attached by three machine-screws, as

shown in Fig. 5. Fig. 6 represents a complete assembly of the countershaft, *T* and *L* representing the tight and loose pulleys.

It will be noted that suitable grease cups are provided for the proper lubrication of each element of the countershaft. The parts should be packed completely full of grease when assembling for use. A shaft constructed in this manner will give very satisfactory service and it is surprising how much power a few of them will save.

Engineering tests show that the rolling friction of ball bearings ranges between one-tenth and one-fifteenth of the rubbing friction of plain journals, so it is readily seen that it takes a comparatively short time to save a very good proportion of the original amount invested in the proper sort of anti-friction equipment upon shop line and countershafts. Less attention is required to keep them properly lubricated.

* * *

Stop Lens Rattle.

When a customer comes in and states his annoyance to be the rattling of the head-light lenses, we fix them as follows:

Take a piece of tire tape and fold over the edges and go clear around the rim of the lens, thus making a cushion that sticks in place and also prevents the lens from turning. This works the best of anything

* * *

Storage Battery Handle.

A storage battery, such as is used in the ordinary automobile, is very awkward to carry unless some sort of a carrying tool or handle is to be had. Such a device can be made from a piece of an automobile spring that will prove very handy to one who handles batteries.

A piece of spring, one inch wide, one-quarter inch thick, and 12 inches long is used. This is slightly curved in the center, making a grip for the hand. About two inches from each end, the spring is bent in the opposite direction, so that the ends can easily be slipped under the handles of the battery and the curvature will prevent the battery from slipping.

The center of the spring should be taped or wrapped with cord so that a good grip can be had.—E. S., Wash.

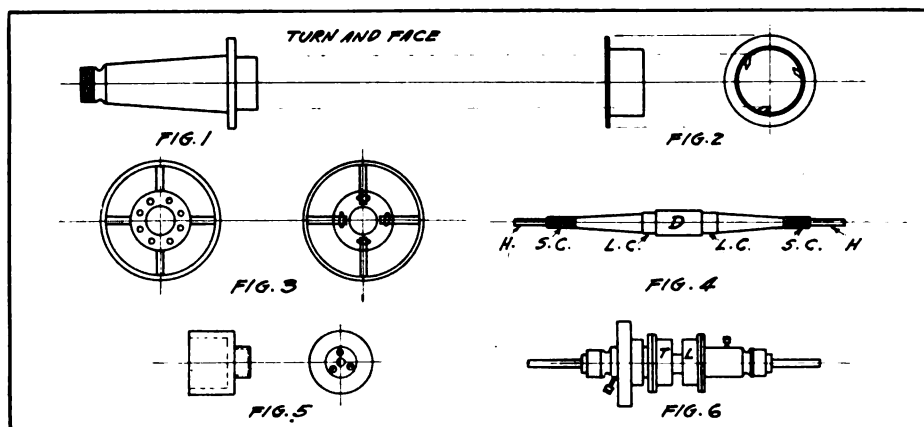
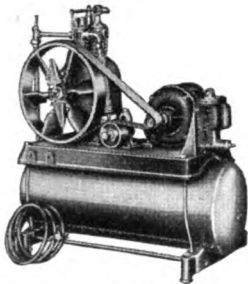


Fig. 6. Complete Assembly of Countershaft. *T* and *L* Are Tight and Loose Pulleys.



Style "S"
Single-Stage Outfit
Belted only—five sizes, $\frac{1}{4}$ to 3 h. p. complete, less driving power.



Style "V"
Two-Stage Outfit
Sizes $\frac{3}{4}$ to 2 h. p. Furnished with automatic starter. A. C. or D. C. motor.

"An Original Design"

YOU can purchase a Curtis Outfit with all the confidence that goes with a well-known, thoroughly established and reliable product. Sixty-nine years of experience, over twenty-six of which have been devoted to the manufacture of air compressors, have enabled Curtis engineers to develop an entirely original design based on sound engineering principles.

First and Only Two-Stage Air Compressor With a Copper Intercooler

Curtis Single-Stage Compressors have controlled splash oiling system—no excess oil to rot tubes. Big saving in oil. Fan flywheel aids in keeping cylinder cool; increases capacity. Hand unloader prevents blowing fuses and jumping belt, and many other exclusive features. Several styles and sizes.

Curtis Two-Stage Compressors have all features of the single stage. Exclusive aeroplane-type copper intercooler assures fullest advantage of two-stage compression. They are perfectly balanced so that the crankshaft bears a uniform load—this assures less vibration and wear. Several styles and capacities. For full information use coupon, or a postal will do.

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CURTIS *Single and Two Stage*
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Curtis
Pneumatic
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Gentlemen:

Please send me descriptive
folder and full particulars on
Curtis Air Compressors.

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Address.....

Jobber's Name.....

Address.....



Some of the Things You Get with a Flexlume Sign—

When you buy a Flexlume Electric Sign you are not simply buying glass and metal. You are buying years of experience in electrical advertising. You are buying artistic design. You are buying 24-hour-a-day advertising at lowest cost, for Flexlumes are day signs as well as night signs—**raised**, snow-white glass letters on a dark background. You are buying the greatest reading distance, lowest upkeep cost and a sign which will give your place of business an atmosphere of distinction.

Let us send you a sketch showing a Flexlume sign for your particular needs.

FLEXLUME CORPORATION

25 KAIL STREET

BUFFALO, N. Y.

Readers' Questions and Answers

Tire Repairwork.

Why does the thread rubber that I vulcanize on outside tires, fabric and cord, always come off?

When getting a casing ready that has a blowout in it, the first thing I do is to buff it well on a buffing wheel, both inside and out.

Next, I give it about four coats of cement. Then, when that has dried about three or four days, I start to build up from the inside of the casing. When that is done, I start to put the thread on the outside, using thread gum one hour at 50-pounds' steam pressure. I have a small boiler and a section mold. I also use air bags inside the casing.

I also keep up the steam, and the job looks neat when it is finished, but it will not stand up. The inside stays all right but the thread gum comes off. It looks like it had not melted or like it was not heated enough.—J. N., Nebr.

We are not entirely clear as to just what information you wish, but we believe that the following will probably cover the difficulty to which you refer.

From your account of the trouble which you are having, we assume that you are in the habit of thoroughly buffing the spot to be repaired. This cannot be done too carefully and a repair may separate if the tire is not properly buffed and cleansed at that point.

Possibly you have not washed the tire after buffing. This should be done with high-test gasoline and the tire allowed to dry until all traces of the gasoline have disappeared.

The application of the cement should be in three or four coats. Each coat is allowed to dry until "tacky" before the next is applied. The time between coats is usually from 30 to 45 minutes. After the last coat has been brushed on, building up may be commenced as soon as the tire has dried from six to eight hours.

Cemented tires must not be hung in a shaft, as the cement will crust on the outside and prevent thorough drying. The repair may be allowed to hang for a period of 24 hours before building up is started, but rarely longer than this. Allowing a tire to dry too long will destroy the adhesive qualities of the cement. This may be causing part of your trouble.

You did not mention how you thinned the vulcanizing cement. Ordinary cement should be thinned with high-test gasoline—72 specific gravity—until it is stringy. This will be slightly thinner than ordinary molasses.

The materials and equipment you are using will give very good results if the right methods are followed. It is hard to give a specific time or pressure for cure, as this varies with the thickness of the repair. A table for the cures of various

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your business, the more you will know—and the more you know, the more money you will make.

Whether you are a dealer, a salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

repairs will be found in the article of the tire series published in our June issue.

By following up the tire repair articles as they appear in the AMERICAN GARAGE & AUTO DEALER, you should be able to clear up any points upon which you are doubtful. A very good reference book may be made by clipping this series of articles from the AMERICAN GARAGE & AUTO DEALER and arranging them in a notebook.

* * *

Ignition from Light Plant.

Would it be possible to run the ignition in a 1½-horsepower Fairbanks-Morse engine from a 32-volt Delco light plant, instead of the dry cells with which the engine is now equipped? Would this be practicable? If not, what action would you suggest?—E. M. & Co., S. Dak.

We are informed that a great many Delco light plants are being used to supply ignition for gas engines in place of dry cells.

This is most satisfactorily accomplished by attaching the ignition apparatus to an ordinary light socket and placing a 32-volt lamp in series with the ignition apparatus.

The size lamp must be selected according to the type of ignition apparatus being used. We would suggest starting with a 20-watt

lamp and then increasing the size lamp until satisfactory ignition is obtained. It is not advisable to use a lamp larger than that which is necessary.

* * *

Liability for Rented Car.

Can your legal department cite us to a case where a rent-a-car company has been held liable for damage, either personal or property, when the renter has signed a contract assuming all liability for the car.—T. R. A. Co., Okla.

Your question is not entirely clear, for it does not disclose whether the liability of the owner to the renter is meant or his liability to some third person, nor does it disclose whether it is for damage to the automobile or to the property or person of another than the one using the car.

We can find no such case, however, and the reason is that the law is so plain that there is little occasion for such a case to reach the higher court, assuming that the inquiry relates to cases in which the user, while driving a rented car, causes injury to the person or property of another.

In the first place, the liability or non-liability of the owner of the car is not affected one way or the other by the contract between the owner and the one hiring the machine. If the owner is liable, he is liable whether there is such a contract or not.

No person can escape the consequences of his own negligence or of his own act, whether negligent or not, by contracting with another to assume that liability. Of course, such a contract would enable the owner to recover afterward from the user whatever he, the owner, has had to pay out.

In the second place, whether the owner is liable or not depends upon his own negligence or lack of negligence, without regard to what the other has done or undertaken. It will be seen, therefore, that the contract has no bearing on the matter of primary liability of the owner of the car.

Whether the owner of a car, who hires it out to another, is liable to a third person injured by the operation of the machine depends upon a number of things.

For one thing, it depends upon the statutes of the state where the accident happens. We do not have access to the statutes of the state of Oklahoma and are, therefore, unable to state whether there is in Oklahoma such a statute as other states have enacted.

Many of the states have laws which provide that the owner of a car is responsible for damage done by it if it is being operated at the time by a person in the owner's employ and engaged in the owner's business. Other states go farther and declare

Your Electric Service—

How do you handle it?

If you haven't a test bench, why not build one?

Let us send you a sample layout with wiring diagrams, specifications and prices of every part required to make up your own equipment.

You can get just what you want, you can add more parts as your needs develop—and you can save a lot of money on the job.

The coupon will show you the road to profits on starting, lighting and ignition repairs—and the information won't cost you a cent.

H. P. MANLY,
1010 S. Michigan Ave., CHICAGO, ILL.

Without cost to me, send complete details of how I can get the parts to make an auto-electric test bench.

Name _____

Address _____

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

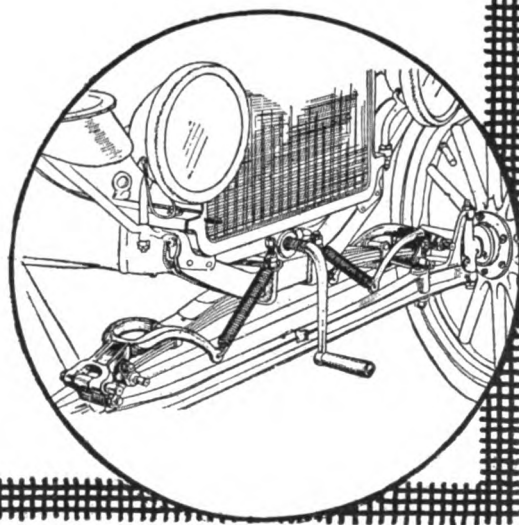
Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

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London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

that the owner is liable if the car is being run at the time by any person with the knowledge and permission of the owner, which would be the case where a rent-a-car company hired out one of its vehicles.

These statutes have been generally upheld as not at a variance with the constitution, notably in Michigan.

In Tennessee, the person injured is given a lien on the car for his damages if the automobile is being operated by one with the implied knowledge and consent of the owner. In that state, the rent-a-car company would be liable if the user had a collision or other accident while operating the hired car and damages to person or property resulted. South Carolina seems to have the same or a similar law.

Most of the cases in which the owner is held liable rest upon the hiring of a car to a person incompetent to use it properly. In the main, and in the absence of a statute covering the case, the owner of cars which he hires out is liable only for his own negligence and not that of the driver.

If every precaution is taken by the owner, such as seeing that the brakes are in good order and all other parts of the machinery safe, and by being careful not to let the cars out to the youthful or careless, the owner will, at common law, escape liability.

If the question refers to a case of damage to the hired car, while being used by the one who hired it, then the contract would have some bearing, although even then there is no particular occasion for the contract. The hirer of an article is liable for damages resulting from injury to it while he is using it, without any such contract, being bound to return it in the same condition as when he hired it, reasonable wear and tear from the use being excepted.

* * *

Recharging Ford Magneto.

Will you please tell me how to recharge a Ford magneto from a city light plant?—F. H., Wis.

It is possible to charge a Ford magneto from a 110-volt direct-current line, although results are not always very satisfactory.

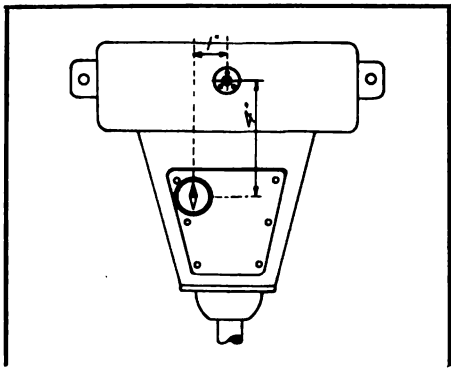


Fig. 1. Place Compass Over Flywheel.

Before the current is applied to the magneto, the flywheel must be set in proper relation to the coils. This relation is checked by placing a compass over the flywheel as shown in Fig. 1.

After removing the floor boards and disconnecting the wires from the magneto post, place the compass about four inches back and one inch to the left of the post. The left side of the hood should then be

Now It's Your Turn.

In answering these queries concerning the difficulties arising in garage work, we have given the generally approved methods.

But we realize that many of our readers will have a different way of "doing the trick," and can offer interesting and helpful suggestions from a different angle. So we would like to have you tell us whenever you have a different method for handling these various questions.

Let's make this a Round Table for the exchange of ideas and thus be mutually helpful!

raised so that the compass is in view when cranking the engine.

Now turn the engine over until the needle of the compass points towards the front of the car.

It is now necessary to test the polarity of the charging line. This can best be done by placing a 110-volt bulb in series, as shown in Fig. 2, placing the ends of the wires in a glass of salt water.

The negative side of the line will be the wire that shows the most bubbles. The positive wire should be connected to the magneto post.

As the resistance of the Ford magneto is 0.25 ohm, the ordinary fuse in the circuit would be blown out before the magnets would be fully charged. It is, therefore, necessary to use a piece of solder wire as a temporary fuse.

This will allow about 30 amperes to flow for a fraction of a second before the fuse will burn out. The negative wire is then touched to the frame of the car, completing the circuit.

* * *

Operating the Welding Shop.

As I am in the horse-shoeing business and would like to start in the welding and cutting business, I would be pleased to get some information from someone who could give it to me, as to how to go about it.—J. V. F., Mo.

In the first place, it would not be necessary for you to give up the horse-shoeing business in order to enter the welding business, unless you so desire, since all of your shoeing shop tools can be used to an advantage in the welding business. In fact, many of them are absolutely essential. You will need few other tools in your welding shop than those you already have in the shoeing shop.

As for the actual welding equipment, unless you know you will have considerable welding to do, we would advise the use of

tanked gas. Of course, a generator is cheaper in the long run where there is much welding to be done.

To start out, you should have a medium-size welding torch completely equipped with tips, gages and regulators. Torchweld or Oxweld are good torches. A cutting torch is not necessary at the start but really should be on hand.

The tanked gas may be had through a rental system, from one of several large producers.

If your shoeing shop is fairly well equipped, you will not need to buy a lot of tools, other than the actual welding plant and supplies. You may practice welding for a few weeks on discarded castings before you give up the shoeing business entirely.

There are several good books on the market which cover the process from the beginner's standpoint. It would be well to get one of these and study the theory along with actual practice in torch operating. The Acetylene Journal Publishing Co., 1228 Michigan avenue, Chicago, handles a very complete list of books.

The department on Welding, Cutting and Brazing, will be found helpful to those who intend to engage in this line of work.

* * *

Compression for Rebuilt Car.

We are rebuilding a Chevrolet 490 into a racing car and are somewhat puzzled about the compression best suited for this type of work. Does increasing the pressure increase the power of the motor? How can it be done in this motor? What disadvantage could we expect from such a change?—B. M., Wis.

Increased compression increases the power of an engine, provided conditions are such that it can be used effectively. Pistons which are 1-8-inch longer above the piston pin have been used in this engine very successfully. This requires special pistons which are rather expensive and, if the cylinders are not in very good condition, may strike a shoulder at the top point of travel of the old piston and rings.

The chief trouble which high compression

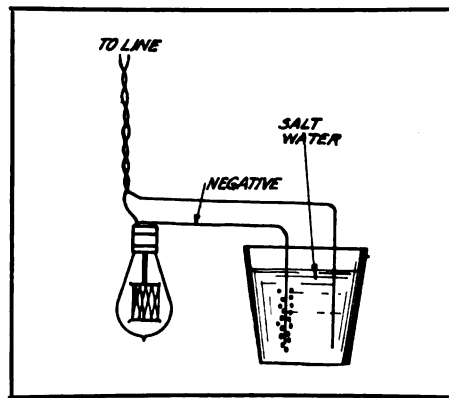


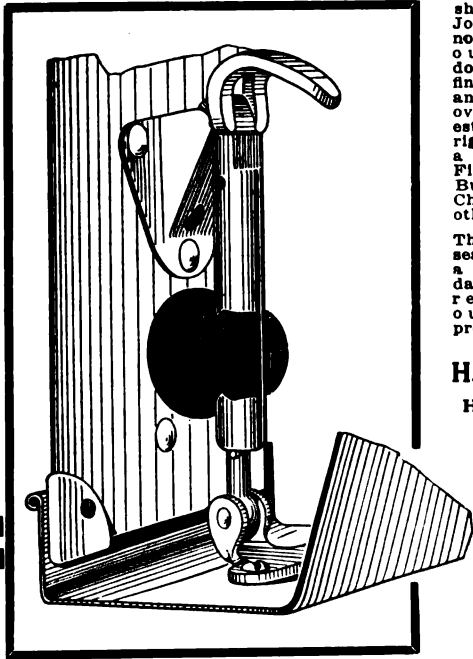
Fig. 2. Wire Ends In Glass of Salt Water.

sion might cause is pre-ignition. If the carbon is kept out of the engine and it is well cooled, no trouble should occur. The engine would not idle quite as well as with lower compression.

SH-H-H-H!

**Perfect Quiet. No More Hood Rattles.
The Jorgensen Hood-Silencer Stops Them Forever!**

Made of rubber in one piece, with hole in silencer on slant to conform with angle of hood-fasteners, and with vacuum cup at



one side which fits close to the hood, preventing shifting. The Jorgensen has nothing to get out of order, does not mar the finish of the car, and holds firm over the roughest roads. It is rightly named—a silencer. Fits Dodge, Buick, Maxwell, Chevrolet, and other makes.

The touring season is on! Get a trial order today and reap the rewards from our fine dealer proposition.

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No. 21. Peerless Steel Barrel Air Pump. Anchored into base by Patented Process. Quick acting air chuck, heavy tubing, reinforced base with special ground grip flanges.

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There is profit for the dealer in selling one line of pumps—if within that scope he has A SIZE — A STYLE — A PRICE to satisfy every customer. There is also economy, for his turnover is naturally big.

AUTOQUIP Pumps are so recognized.

Write today for prices and discounts. Giving name of your Jobber.



No. 21 Paramount. High grade single acting pump. LOX-on Jr. Air Chuck. Brass Tube and Brass Check Valve. Heavy Reinforced Base, length 21" over all. **A LIFE LONG PUMP.**

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Nokorode will quickly, easily and permanently solder all metals but aluminum.

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Nokorode is carefully compounded — contains no acid. Its quality never fluctuates.

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Nokorode works fast and effectively, and results are everlasting.

ECONOMY:—

Nokorode is ready for instant use. Spreads further and more uniformly than any other flux, and does away with all mixing—saves both flux and time.

SAFETY:—

Nokorode is harmless—if spilled on the operators' hands or clothing it will not burn—has no disagreeable fumes.

Every can sold under our guarantee of satisfaction, or we will refund direct the full resale price.

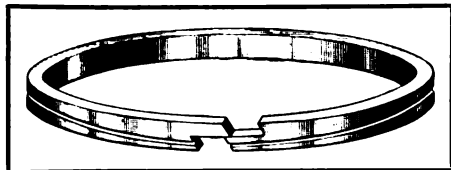
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NOKORODE PRODUCTS THE MOST
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FLUX IN THE WORLD.

THE M. W. DUNTON CO.
670 Eddy St. Providence, R. I.

Accessories—Dealers' Key to Profits

Wicaco Is the Ring With the "Wandering Oil Groove."

"They are getting down to a real study of piston-ring construction these days," remarked the dealer, reflectively. "And it is resulting in the development of some very



Ring With the "Wandering Oil Groove."

fine principles in piston-ring construction."

"Now, take, for instance, this Wicaco twin-cut ring, which they call the ring with the 'wandering oil groove.' It combines some of the best features of construction. First, you will notice that it is made of individual, close grain, gray iron castings, having an exceptional evenness in expansion.

"Further, it is concentric in construction, thus assuring equiradial expansion against the cylinder wall. In order to give perfect seating, it has been ground to perfect roundness. It's a splendid ring for reground cylinders, as it gives a perfect fit.

"You will notice, too, that the Wicaco ring combines the diagonal and step joint, together with a superior joint. This is in order that compression loss at the slot may be obviated.

"Again, the Wicaco twin-cut is the only piston ring with the 'wandering oil groove.' This 'wandering oil groove' is designed to assist the ring to expand evenly. It carries a film of oil which lessens friction and hence prolongs the life of the ring.

"Providing a constant film of oil between the piston ring and the cylinder wall, this 'wandering oil groove' creates a seal, making possible the consumption of every drop of gasoline, superinduced by proper carburetion and ignition, and so increasing the mileage per gallon.

"The 'wandering oil groove' is also designed to obviate the passage of oil into the firing chamber, and so reduce oil consumption and prevent the formation of carbon. Because of its sloping construction, it lubricates the parts that are in constant contact, particularly the entire periphery of the ring.

"On the upstroke, the 'wandering oil groove' carries the oil to lubricate, and on the downstroke it scrapes the oil and sends it back into the crankcase to be used for lubrication.

"Wicaco twin-cut rings are machined to micrometer correctness, in standard and in 0.005, 0.010, 0.020, 0.030 and 0.040. sizes.

"These are the reasons why we call Wicaco twin-cut piston rings 'safe arteries of the motor.'"

And there you have the description of the ring with the "wandering oil groove."

Further information and prices on the Wicaco twin-cut piston rings, which are sold with a "money back" guarantee, can be had upon request from Wicaco Screw & Machine Works, Inc., Stenton Ave. and Loudon St., Philadelphia, Pa.

"Howdy Folks!" It's Spee-Dee in New Collapsible Tube Form.

Here's the little story! Spee-Dee which, of course, needs no introduction to the automotive trade—so long has it been serving them as a handy hand cleanser—is making its "bow" in a convenient, collapsible tube. This is in answer to a widespread demand for the product in a smaller container than the can in which it usually makes its appearance.

Just as the gageman and motorist found the can of Spee-Dee a "good pal" to carry along the road or to use in the shop when hands were heavy with grease and grime and there was no water available, now in the overall pockets and in the pockets of the cars of these same individuals is found Spee-Dee in its collapsible container, from which it can be taken as desired—a ribbon of thick, creamy cleanser—fresh and clean.

It requires only a bit of Spee-Dee squeezed into the hands and well rubbed in to make dirt and grime vanish. There's no lye, acid or grit to injure the skin, says the manufacturer. The new form container, as we said before, is particularly convenient—made to fit the side pocket of any car, easy to carry about.

Such a tube proves economical, too, not only in its initial cost, but owing to the fact that the user takes from the tube only as much as he will need. And Spee-Dee from a tube is sanitary, as the unused portion remains in the container, undisturbed and very clean. Each tube holds enough for three dozen "washes."

A "good-looking" label in red, yellow,

blue and white, binds the tube, so it's attractive for a counter display, packed with its "brothers" in a case holding three dozen containers.

Prices and more complete data concerning the Spee-Dee in its new "guise" will be furnished upon request. Write to the States Chemical Co., 680 West Austin Ave., Chicago, Ill.

An All-the-Year-Around Accessory—the Universal Cut-Out.

One of the special features to be noted in the Universal cut-out which is now being offered by the Waller Mfg. Co., of Oelwein, Iowa, is that it is made with an enclosed bottom which, it is said, overcomes all possibilities of dirt and mud lodging under the flap.

It is not necessary to cut the pipe in two when equipping a car with a Universal cut-out. It is made in two pieces and is easily installed.

Heavy steel is used for the construction of the flap, which is machined to a perfect fit. Being set in an inclined position, and so niched as to fit snugly on the inside of the exhaust pipe, this flap, when opened, completely shuts off the line to the muffler.

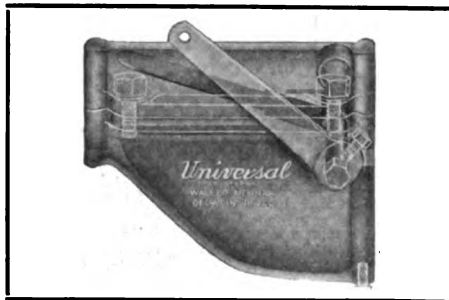
In the summer this accessory is used as an ordinary cut-out, and in the winter it is used as a means of deflecting the exhaust through a heater. Being adjustable, as much heat can be thrown through the heater as required, it is said. In the summer, the cut-out can be made as loud as may be desired.

All that is necessary to attach a heater to the cut-out is to slip a piece of flexible tubing into the opening in the bottom of the cut-out and fasten it with the set-screw.

The entire cut-out is made of high-grade, gray iron, and the lever for opening it is of malleable iron. A neat dash control is furnished with all but the 1½-inch



"Spee-Dee Always a Good Pal."



Universal Cut-Out Is Easily Installed.

(Ford) size, thus eliminating the trouble of having the foot pedal and cable interfering when removing the floor boards.

Information and descriptive matter will be supplied to all interested by the Waller Mfg. Co., Oelwein, Iowa.

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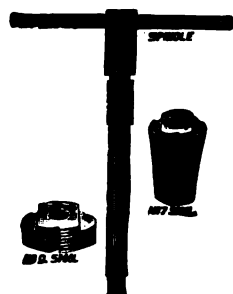
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The Holly Bushing Extractor

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Used and recommended by leading motor manufacturers. Tools to be had singly or in sets.



No. 79. Extracts bushings—1 $\frac{7}{16}$ to 2 $\frac{5}{16}$ inclusive.



No. 79 extracting Ford Transmission Reverse Drum Bushing.

Standard set (Nos. 0, 1, 2, 3, 4 and 34B tools) \$18.40

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INCREASE your profits—make more sales and better satisfied customers. Genuine leather products have come back into their own. They are better than substitute materials and **now are as low priced.** That's why every dealer should be interested in our complete line—

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Anti-Squeak Lacing



Our Group Fan Belts are especially popular this year. They enable dealers to fill all ordinary requirements from a very compact stock. The "Popular" Group (shown above) accommodates 212—and the "Favorite" Group accommodates 288—leading makes and models of cars, trucks and tractors. Also, keep in mind this well-known standard product—



Flat Fan Belting in Rolls

Sold by leading dealers everywhere. Ask your jobber for full information or write today for our complete catalog and discounts.

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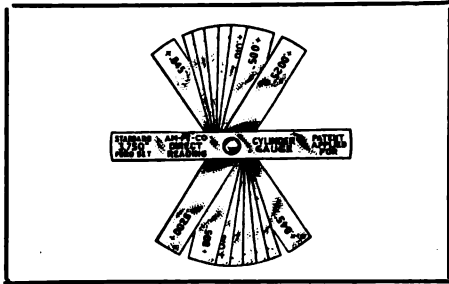
INDIANAPOLIS

MEMPHIS
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If It's an Am-Pe-Co It's Always on the Job in Cylinder Gaging.

And not only is the Am-Pe-Co direct reading cylinder gage a worker that is always on the job—it is also declared to be a worker of unfailing accuracy.

The operation of the Am-Pe-Co direct



Operation of Am-Pe-Co is Very Simple.

reading cylinder gage is very simple. All that is necessary is to slip the gage down into the cylinder, trying one blade after another until you find the right one, and it will tell you at a glance the true size. It obviates the necessity of the complicated figuring required with the internal micrometer.

There are no adjustments nor movable parts to be put out of true by particles of grit. The ends of the blade are true arcs, and the measurement is from diametrically opposite points anywhere on the half-inch blade. Thus correct measurement is assured even though the gage is not held exactly at a right angle to the wall of the cylinder. Every test measurement, correct to within 0.00025 of an inch, is quickly made and positively established without the slightest chance of mistake, it is stated.

The Am-Pe-Co is made of hardened and polished steel, one-half inch wide and assembled in sets, among which there is a gage to fit every make of car.

A considerable reduction in price has been made on the Am-Pe-Co direct reading cylinder gage. Write the Am-Pe-Co Sales Co., Marshalltown, Iowa, for new price list and full particulars concerning the Am-Pe-Co.

Patents Granted Turner Manufacturing Company on 2-in-1 Timer.

Although the Turner 2-in-1 timer, for all Ford motors, has been manufactured and marketed for a period of nearly six years, it was only recently that patents were granted on the device.

Earl Turner, inventor of the Turner timer and president of the Turner Mfg. Co. of Kokomo, Ind., was much gratified to learn that his patents had been granted, since they had been pending since 1917. Blame for the delay in the patent office is assigned to the fact that the application was made during the war period, when all the offices in Washington were in much confusion.

The grant of the patent gives Mr. Turner

free rein to protect his interests against infringements. Two more patents are now pending which will cover all the improved features of the Turner 2-in-1 timer.

The demand for the products of the Turner Mfg. Co. has been so great that it has been necessary to increase production time and again during the past two years. It was only a few months ago that the floor space of the shops and plant was more than doubled and already new expansion has become necessary.

Federal Electric Signs "Tell" 'Em You Sell 'Em.

"The more you tell, the more you sell," is a familiar phrase. What better way is there of "telling" the public about your business than by the use of an appropriate and attractive electric sign?

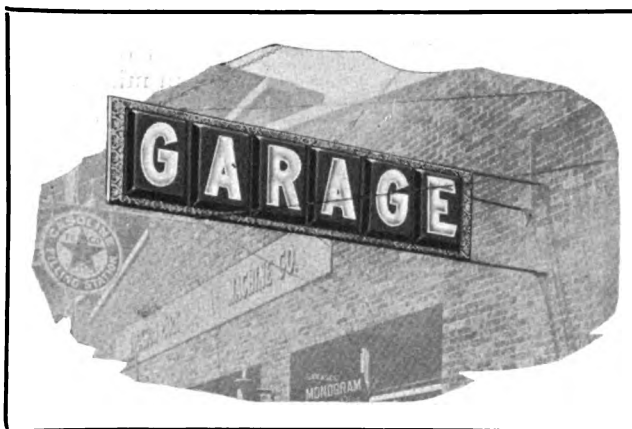
That the new Federal embossed porcelain-Silveray electric signs are real business boosters cannot be doubted by anyone who has seen them. These signs combine the regular blue and white enameled sign and the snow-white, raised, Silveray glass letters.

The letters fit right into the embossed plates and are illuminated by a small number of lamps within the sign, which makes the sign very economical to operate.

The embossed plates, in which the main letterings of the sign are placed, make the reading matter stand out very prominently and also afford an artistic effect.

On the top and bottom panels of the sign, the unilluminated lettering is white on a royal blue background. Each Silveray letter has a white enamel stripe around the letter for maximum legibility.

Porcelain-Silveray electric signs are built for years of service, requiring only an occasional washing to keep them like new.



Porcelain-Silveray Electric Signs Built for Years of Service.

Provision for relamping is made by arranging alternate letter plates, on one side only, so that such plates can be removed.

Descriptive literature, prices, etc., will be promptly forwarded to those interested by the Federal Electric Co., AGAD 8, 8700 So. State St., Chicago.

The New Two-Piece, Vapor-Tight, Leak-Proof Laco Piston Ring.

Instant reduction of friction, with just the result the motorist desires to make motoring a real joy at all times, is the work accomplished by the "Laco" piston ring, according to the Locomotive Appliance Co.,



"Laco" Ring Pleases Exacting Motorists.

Toledo, Ohio, manufacturers of "Laco" piston rings.

Originally developed for use in a locomotive throttle valve, where one ring is required to seal 200 pounds standing pressure of dry steam without oil, the "Laco" piston ring has been perfected to meet the most exacting requirements of motorists.

With "Laco" piston rings, the seat line is said to be unbroken at all times through the use of a diagonal-cut ring within a step-cut ring with openings opposite each other, absolutely preventing the passage of compressed gas. Both oil and gas strike an absolutely tight wall, exactly as shown in the illustration. It is further stated that because of the flexibility of "Laco" rings, they seat themselves to the cylinder wall, even if out of round, and continue to hold compression indefinitely.

The economy features of "Laco" vapor-tight piston rings appeal to the automobile owner. The "Laco" saves oil, saves gasoline by holding compression, reduces carbon deposits to a minimum and eliminates carbon-removing cost.

As a sure indication of the confidence of the manufacturers in the efficiency of "Laco" piston rings, a full money-back guarantee comes with each order.

Paragraph.

GLEN HARKRADER, formerly sales manager of the No-Leak-O Piston Ring Co., has been appointed territorial representative for the Indiana Piston Ring Co. of Hagerstown, Ind., in the territory west of the Mississippi and in Minnesota, Wisconsin and Illinois. The Indiana Piston Ring Co. manu-

factures the Perfect Circle oil-regulating piston ring.

Mr. Harkrader will assume his new duties August 1. He will be assisted by his brother, Wallace Harkrader, formerly territorial representative of the No-Leak-O Piston Ring Co. in Illinois and Indiana.

Battery Repair Men! Automotive Electrical Stations!

Suppose a specialist were to enter your shop and help you select instantly the right battery, magneto or ignition part necessary to handle every job;

—and he also showed you the most economical way to buy Battery and Electrical testing and repair equipment: the kind that insures quick and skillful results;

—and his wealth of information included every tool and Replacement part that finds its way into a modern battery or electrical service station like yours;

—would you like to have his services—FREE?

Our new 138 page catalog is just such an expert—a helper that points a finger to the exact solution of every equipment or parts problem.

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W. F. PRICE BATTERY SUPPLY CO., Inc.
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TURNER 2 in 1 TIMER

Has stood repeated and rigid tests for over five years and has proven a genuine quality article and a boon to every Ford owner. Increases power, insures an instant start in all weather, lessens fouling of two front plugs, saves gasoline and stops motor "kicking." Is oil, grease and water proof. Requires no oiling and is easily installed.

TURNER FOOT ACCELERATOR

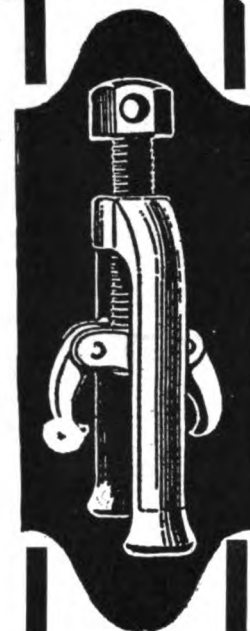
For Fords. Gives positive and quick throttling and allows use of both hands in driving. Installed in 10 minutes by anyone. Simple and durable. Price, \$1.

SPRING SPREADER AND LUBRICATOR

Greatly increases riding qualities of any car, stops squeaks and spring breakage and increases spring wear. Makes steering easier and saves tires. The only device made that spreads spring leaves and lubricates them in one operation without fuss or muss. For all cars. Price \$2.50.

For convenience of car owner we furnish 1-lb. cans of special spring lubricant for use with our Lubricator.

Turner Manufacturing Co.
KOKOMO, INDIANA



"IT'S EASY"

Just get a Buffum Buick Valve Remover and see how **easy** and how quick it makes valve cleaning.

Don't wield an unhandy crowbar any more. Results—good results—are what you want, and that's what you get when you use the Buffum tool. Your customers who have Buicks will want this valve remover, too. Our dealer proposition will, therefore, be of interest to you. It's a dandy. Every tool is backed by our guarantee. Retail price, \$2.00.

Send for data on the Buffum Buick Valve Remover. You will find it valuable.

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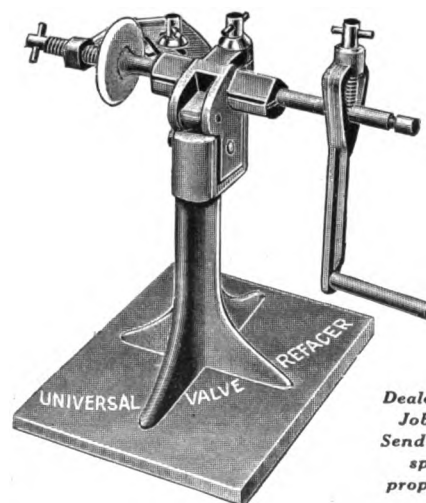
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Valves usually thrown away can be quickly and easily put in A1 condition with the Universal Valve Re-facer. It refaces edges, thins and otherwise reshapes burned and distorted valve heads, saving much time usually spent in grinding. Valves with worn, grooved, or slightly warped stems properly handled. The most rapid valve re-facer made. Specially priced at \$7.00. If your jobber cannot supply you—order direct.

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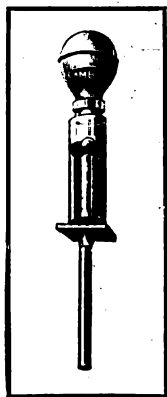


Dealers and
Jobbers:
Send for our
special
proposition

The Harkraders will maintain general sales offices in Chicago and San Francisco. Both Glen and Wallace Harkrader are well known in the piston ring industry.

Novel and Low-Priced Tester for Storage Batteries.

Car owners or radiophone owners will be interested in the novel and exceedingly simple battery tester which is being placed upon the market by the American Bureau of Engineering, Inc., 2632 Prairie Ave., Chicago. It is an hydrometer and can be read in semi-darkness.



Ambu Tester.

The new Ambu battery tester is only 6½ inches long, and consists of a bulb, a filling nozzle of rubber and a glass tube. Inside the tube are three colored balls—red, white and green—these balls being made of materials the specific

gravities of which are different.

A clever inscription on the container tells how to use the device. It reads:

Floats all three, battery is charged fully,
Sinks the white, charge still right;
Sinks the green, charge is lean;
Sinks the red, charge is dead.

The user need not know anything about battery gravities when using this tester. White means right; green—lean; red—dead. It is so designed that it can be carried in the tool box and thus is always handy. The Ambu weighs only a few ounces and is sold at a very attractive price.

Manufacture of Interesting New Rotor Is Announced.

An article of unusual merit in the Ford ignition field has recently been placed upon the market by the White Brass Castings Co., 1654 West Grand Ave., Chicago. It is a neatly designed, well-made rotor that fits any type of Ford timer shell, replacing the ordinary timer rotor.

Many advantages are claimed for this device, but chief among them is the entire elimination of all ignition troubles that are due to oil being present on the contact surfaces.

No lubricant is required in the timer when using a Master rotor as the special brush used is the genuine "Blendite"—composed of copper, graphite and two other metals thoroughly blended. Should any oil enter the timer shell from the motor through the camshaft bearing and cover, the fiber track, and steel contact segments, the oil film is instantly broken by the wipe contact of the Master rotor brush and quick starting assured no matter

how cold the weather, the manufacturer declares.

Experienced Ford repairmen know that timer troubles are among the chief causes of hard starting in cold weather. If one cannot hear the coil units "buzzing" when the engine is cranked, it is generally safe to assume that the trouble is in the timer. The installation of the Master rotor is said to overcome this trouble.

Practically every make of ignition device now being manufactured employs in its design some principle of the wipe contact, using some form of copper or composite brush. There is not a single commutator or distributor in use today employing the roller principle or permitting oil on the contact surfaces except the Ford type of timer.

It is said that the Master rotor assures: Improved electrical contact, because of the perfect "metal-to-metal" surfaces; an oil-less timer, because the lubricant is incorporated in the brush; long life to the timer because all the wear is concentrated on the brush without any detrimental mechanical or electrical effect; easy starting, even in the coldest weather, because there is no oil upon the contact surfaces to congeal. There are also many other economical features.

Metal Stamping Company Issues New Catalog.

A new 28-page catalog put out by the Metal Stamping Co., of Long Island City, N. Y., covers this company's full line of Lyon resilient bumpers and parts, and is a perfect guide for those in the trade interested in the sale of these accessories.

Forty-six illustrations of cars, before, during and after collision; agent's portable stand; accessory dealer's stand; distributor's display rack; envelope inserts and broadsides; an attractive window display, etc., help to make this a particularly attractive and instructive booklet. It will be sent on request to those interested.

New Additions to the Weaver Sales Force Announced.

It will be of interest to many of our readers to know that Del Lang and Joseph Pender have recently joined the sales force of the Weaver Mfg. Co., Springfield, Ill., manufacturers of garage and shop equipment.

For the past five years, Lang has been with the Champion Spark Plug Co., representing them in the northwest territory. Pender comes to the Weaver Mfg. Co. from the United States Steel Products Co., with whom he has been connected for a number of years.

Mr. Lang will travel Wisconsin, Minnesota, North Dakota, South Dakota, and Illinois, except Quincy. Pender's territory includes Texas, except El Paso, Oklahoma, Arkansas and Louisiana, except New Orleans.

Mr. Lang's address is 3508 Eleventh Ave., South Minneapolis, Minn. Mr. Pender, who has made his home in White Plains, N. Y., expects soon to reside in Texas.

It's Easy to Adjust Carbureter Mixture the Imperial Way.

Every Ford owner knows the awkwardness and inconvenience of having to hump away down to the base of the dash and struggle to adjust the carbureter, as well as the uncertainty of whether he has gotten the right degree of adjustment and whether the mixture is rich or lean.

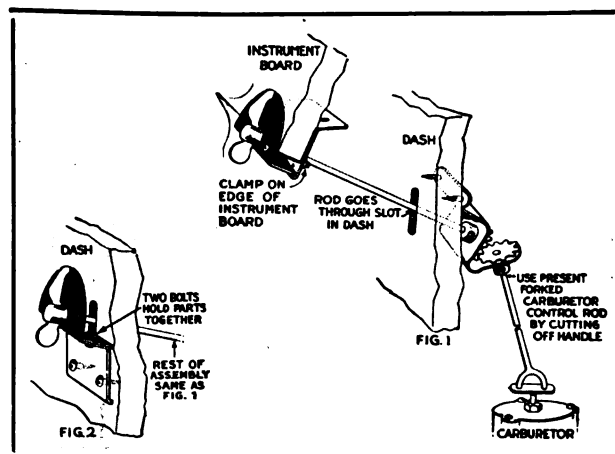
A new device is now being marketed which, it is declared, eliminates both the guesswork and the inconvenience. This is the Imperial carbureter control manufactured by the Imperial Brass Mfg. Co., of Chicago.

The dial of the device, placed on the instrument board, shows just where the needle is set, and indicates the mixture best suited for the car. It can be adjusted by the driver at any time without changing his driving position.

There is no drilling or cutting of either the dash or the instrument board—all that is needed is a pair of pliers, a file and a screwdriver.

Ford owners of either open or closed types of cars will find the Imperial carbureter control equally adapted for their use. Where there is no instrument board, the control may be attached directly to the dash.

In Fig. 1 is shown the method of in-



Imperial Carbureter Control Is Easily Attached.

stalling the carbureter controlling device where there is an instrument board in the car. In Fig. 2 the installation where there is no instrument board, the dial of the device is placed directly upon the dash.

Further details may be had upon request from the Imperial Brass Mfg. Co., 120v West Harrison St., Chicago.

J. NEWTON BODDY

*Auditor, Accountant, Systematizer
Specialist in Automotive Accounting*

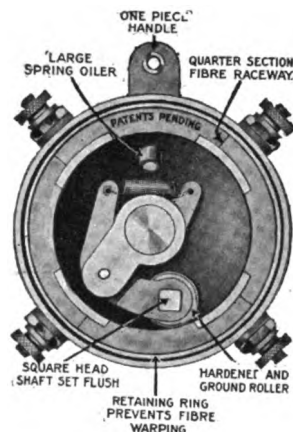
**Audits, Investigations, Surveys, Systems
Income Tax Reports**

**Monthly Balance Sheets and
Operating Statements Prepared.
Unit and Process Costs Established.**

**322 South Fourth Street
Phone Atlantic 1818
Minneapolis, Minn.**

**Cash Journals, Sales Journals, Ledger Leaves,
Purchase Journals, Car Records, Truck Records,
Storage Tags, Shop Cards, Duplicate Statements,
Special Forms, Purchase Orders, Invoices,
Sales Books, Blank Books, Loose Leaf Binders.**

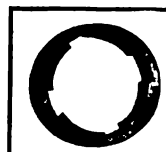
*We Specialize in Systems for Automotive
Dealers*



A BETTER TIMER TO TIME 'ER BETTER

The M & R was designed for all types Fords and tractors. On solid ring fibre, two of the wearing surfaces are with the grain and two against grain—one of the main "reasons" for such a quality timer. It's backed by our guarantee. Your customers will be enthusiastic about the M & R. Write for details—now.

McCulloch Mfg. Co.
216 High Street Boston, Mass.



Raceway—made in four sections—all cut against grain.



Oiler—spring-top type, self-closing, of sensible size.



Retaining Ring binds raceway, keeping it absolutely rigid.



Handle—made in one piece and securely attached to shell.

Unique Construction that Positively Prevents Fouling

The **ASKO** SPARK PLUG is so designed that it burns off the oil from the vital parts as soon as it is deposited. Without this oil to bake in with the soot no carbon can form. The dry soot is easily disposed of—Simply blown out of the plug chamber with every exhaust. This method is infinitely superior to ineffectual efforts to prevent the deposit of soot and oil.

That the **ASKO** does not foul has been proved on thousands of cars of all makes under the most rigorous service conditions.

The **ASKO** is strictly a heavy duty plug—body all brass, heavy stone 775 insulator and oil splash plate.

Thousands in use—sells on its merits.
DEALERS—Write today for data.

Allen Specialty Co.
2751 West Lake St. CHICAGO

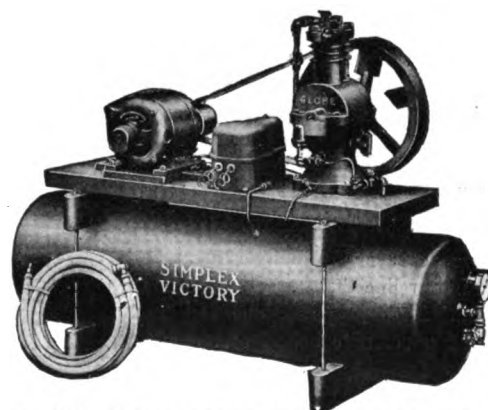


Manufacturers also of OWL Plugs especially designed for Fords and Fordsons

THERE HE GOES

Another good customer lost because the old compressor has fallen down on the job just when he wanted his tires filled.

WELL, YOU DON'T HAVE TO LET HIM GO.
Hold your old customers and make new ones with a dependable air supply—



GLOBE SIMPLEX TWO-STAGE COMPRESSOR

Guaranteed to Pump more air for the amount of current consumed than any other type of compressor on the market. High in efficiency—Low in operating cost—Simple in construction—Reasonable in price and on the job all the time.

**DON'T WAIT. BUY NOW AND LET THE
SIMPLEX END YOUR AIR TROUBLES.**

GLOBE MANUFACTURING CO.
Battle Creek, Mich.

Up-to-the-Minute Garage Equipment

Postoffice Department Installs Valley Buffers in Garages.

The Valley Electric Co., Kingshighway and Connecticut St., St. Louis Mo., which manufactures electric motors, buffers, motor-generator sets and battery charges,



Valley Buffer is Mounted on Heavy Cast-Iron Base.

reports the sale of 17 buffers to the post-office department of the federal government.

These buffers have been shipped to the tire service sections of the postoffice garages in Atlanta, Detroit, Kansas City, Los Angeles, Memphis, Omaha, Cincinnati, Newark, Buffalo, Denver, Dallas, Norfolk, Grand Rapids, Jacksonville and Chattanooga.

The Valley buffer is a standard, ball-bearing Valley motor, of two horsepower, with the rotor shaft extended sufficiently on each side to carry an emery stone and a compound brush. The buffer is mounted on a heavy, cast-iron base, carefully proportioned to give rigidity to the whole machine. The end plates of the motor are enclosed, keeping the windings free from dust. The buffer is 46 inches high and occupies four square inches of floor space,

The Valley Electric Co., also manufactures a small, flexible shaft buffer for bench work.

Belted Motor Drive Grinders Give Real Satisfaction.

"We have never made an investment for equipment in our line that has given us such complete satisfaction," wrote one delighted purchaser of a portable belted motor drive grinder.

This machine was one of the line of portable belted motor-drive grinders and polishing machines which is now being marketed by the Saint Louis Machine Tool Co., 902 Loughborough Ave., St. Louis, Mo., and a type of which is shown in the illustration.

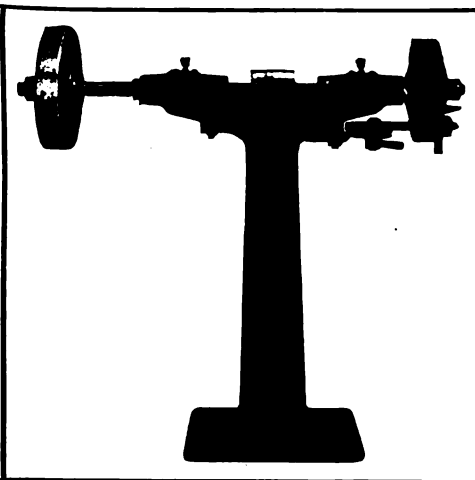
Unless otherwise ordered, these grinders are put up to run at about 5,000 feet and the polishing machines at 7,000 to 7,500 feet. Any reasonable speed desired can be furnished and if the user wishes to change the speed, this can very easily be done.

The manufacturer has selected as a standard a fully enclosed, dustproof motor of the repulsion start, induction run type, single phase or 3-phase squirrel cage.

The belt is made endless and is of the best leather, and the motor has two inches of adjustment to tighten the belt.

Particularly to be noted is the wheel guard, which is an exceptionally effective open type, consisting of a steel channel rolled to a segment of a circle. This is very stiff and unbreakable, and is further reinforced by a heavy cast-iron bracket that is riveted to the inside flange of the channel.

The bracket is attached to the back rest of the machine by a bolt which slides in the slot and allows the guard to be adjusted backward as the wheel wears. The lips of the guard can be kept close to the wheel, where they are not in the operator's way, and thus eliminate the danger of dropping material between the wheel and the guard.



One of the Many Types of Portable Belted Motor Drive Grinders.

This guard effectively prevents fragments from striking the operator, and if the wheel should break it would strike inside the flanges of the channel and be prevented from flying.

The garageman will be sure to find just the type of machine his shop requires among the 118 different sizes and types of grinders and polishers which this company is offering, and for a reasonable price.

Write the Saint Louis Machine Tool Co., 902 Loughborough Ave., St. Louis, Mo., for details.

Lead Welding and Battery Repair-work Profitable?—Read "Sparks."

The Bastian-Blessing Co., of Chicago, is distributing a leaflet which is unusually interesting. This is so because it is not simply a piece of advertising literature, but contains information that is very valuable to the repairman.

It presents a clearly written and illustrated article giving in detail the procedure for handling the lead welding job. This is information which will be appreciated in the shop handling this type of repairwork—if you are not now handling jobs of lead welding and battery repair, it will show the profitable features of this work.

Ask the Bastian-Blessing Co., 185 West Austin Ave., Chicago, to send you "Sparks" leaflet No. 2.

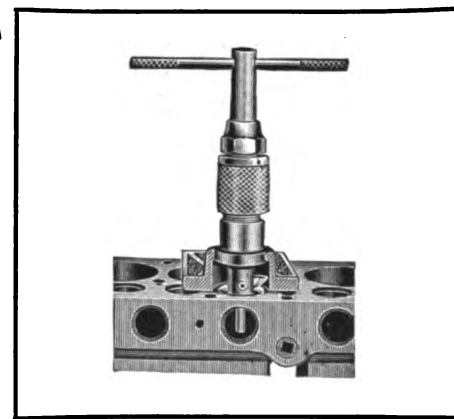
You Know the Valves Are Seated Right With a "Davis."

For the garageman and repairman who has found valve reseating a troublesome job, there is a new tool on the market which, it is declared, will give every seat a perfect job.

The Davis valve reseating and boring tool is held to the cut by a perfect screw-feed device which is designed to eliminate all digging in, sliding over the cut and chatter. It does not depend upon the small pilot end to guide the cutter but the cutters are guided by a large and accurately ground bearing above the valve seat.

For renewing or enlarging the ports, this tool is said to give perfect work, making the actual surface of the valve seat narrower. After continued grinding and facing of seats, they are likely to be too wide, allowing carbon to be deposited on the large surface, while the narrower valve seat will expel the carbon and will keep in shape longer and be easier to grind.

Valve ports can also be rebored larger,



The "Davis" Valve Reseating Tool.

so that a larger size valve may be used. On many motors this is said to add to the power and speed very materially, giving a quicker inlet and outlet to the cylinder charge.

The cutters are regular lathe tools, made of the best high-speed steel and will last for years. Any shop man can re-sharpen and keep them in shape.



One Dealer Says:

"The F R M Ford timer is the only one I have ever sold that gave perfect satisfaction to my customers; duplicate my last order as soon as possible."

One Owner Says:

"I travel all over Northern Illinois in a Ford and I never got such good gas mileage, nor had such little trouble with the motor as I have since using the F R M Timer. I never clean a plug."

**Hundreds Praise the
F R M Ford Timer**

It fires from high compression to the extreme end of the stroke, always leaving the spark plugs clean.

10 Times Hotter Spark

The long contact and heavy bronze brush increase spark, double power, increase gas mileage, make starting easy, keep spark plugs clean. Sold on 30 days' free trial with


Money Back Guarantee

Liberal offer to dealers and jobbers. If our representative hasn't called on you write us today for complete information and prices.

Retail Price Complete, All Wires Enclosed,
\$3.50

FR M Mfg. Co.
Fairbury, Ill.

Mushrooms or Toadstools?




You can always tell Genuine North East Parts from "roadstool" substitutes by the Yellow North East Box.


Genuine North East Service Parts are distributed to the trade by

NORTH EAST SERVICE INC.
ROCHESTER, N. Y., U. S. A.

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| Atlanta, Ga. | Rochester, N. Y. |
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**THE FRISZ
WHEEL
& GEAR
PULLER**



**NEVER
SLIPS**

*Made in
FOUR SIZES
to take care
of all size
gears and
wheels*

Don't Waste Time and Lose Money

fussing with a wheel puller that grips poorly and slips.

Get the Frisz Wheel and Gear Puller. Its massive gripping fingers hold like a ship's anchor. They never slip and their grip is equally automatic, whether expanding or contracting. The drop forged, high carbon, nickel steel arms are always parallel with the power screw. This means a pull always in a straight pull—an easy pull.

Free from complicated parts. Needs no special attachments. Made of finest materials; heavily reinforced where stresses come heaviest.

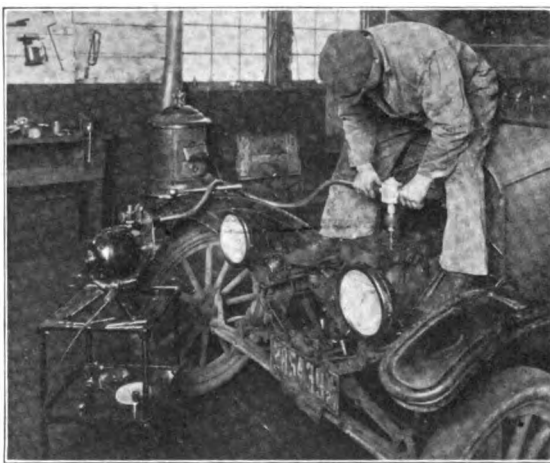
Get the Frisz Wheel and Gear Puller from your jobber—today.

JOBBERS—Write for our interesting proposition.

FRISZ MFG. CO.

34th and Illinois Sts.

Indianapolis, Ind.



Drills

Grinds Tools

Improves Welds

Removes Carbon

A little machine shop for your establishment! The **Utilitool**. Grinds, drills, removes carbon and rust, improves welds, buffs tires. Motor $\frac{1}{2}$ H. P. ball bearing. Speeds—900, 1800 and 3600 R. P. M. Shaft—Haskins improved wire wound $7/16" \times 5'$.

You'll want complete details, of course. Write now!

R. G. HASKINS CO.
25 S. Desplaines St. Chicago, Ill.

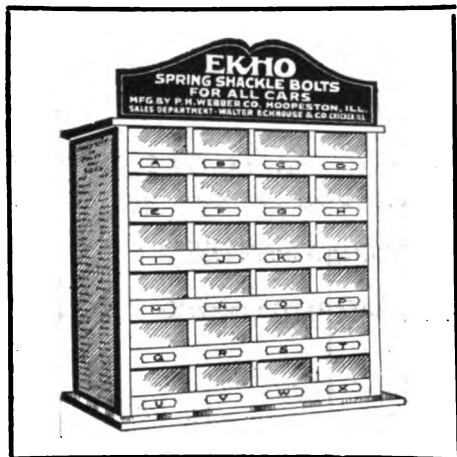
Provision has been made for pilots centering in worn guide holes.

The tool is also equipped with an attachment for the handling of Buick valve cages.

Additional information will be promptly forwarded to those requesting it by the Hinckley Machine Works, Hinckley, Ill.

Full Line of Spring Shackle Bolts and Attractive Display Cabinet.

A complete line of spring shackle bolts with an attractive display cabinet is now



Complete Line of Spring Shackle Bolts in Attractive Display Cabinet.

manufactured by P. H. Webber Co., Hoopston, Ill.

The cabinet contains 24 sizes of bolts, 113 bolts per cabinet. The 24 sizes of bolts will fit 310 models of popular cars. A list is furnished with each cabinet, so that the bolt desired may be instantly located in the cabinet.

The shackle bolts are turned from hexagon S. A. E. 10-20 steel. Each bolt is carefully tested before leaving the factory. All bolts are carbonized and case-hardened and made to close limits. All bolts are tapped with a $\frac{1}{8}$ -inch pipe tap, to accommodate any standard grease cup or pressure greasing system.

Long Tests Prove New Vulcanizer Thoroughly Satisfactory.

The Automatic Electric Heater Co., of Warren, Pa., is offering a new departure in electric tube vulcanizers. Long field tests, it is said, have proved this product thoroughly satisfactory, and it is announced that it is now being produced in quantities for the trade.

This vulcanizer is furnished in one size at the present time, with an operating surface eight inches wide by 20 inches long. Due to its rapid heating, it is said that it will handle the work of any garage or repairshop.

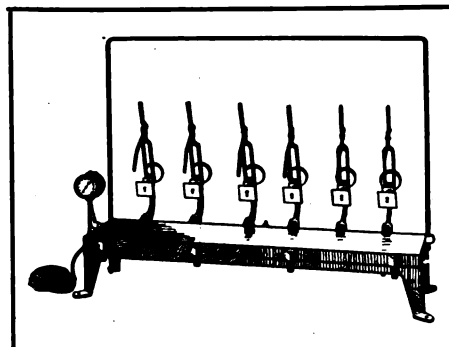
Each machine is furnished complete with four adjustable tube arms. Heat is generated by a special electric heating unit which covers the entire base of the vulcanizer. The casing is made of two heavy steel stampings, telescoped and welded to-

gether, providing a hot-air chamber between the upper and lower plates. Thus only heated air, under automatic temperature regulation, is directed against the vulcanizing surface and all necessity for water, steam or pressure is done away with. There can be no danger from explosion.

A new method of temperature regulation is provided by the Sepco automatic control which is installed directly in the heated chamber, so that the vulcanizing surface is maintained accurately at just the right degree and is equal to 60 pounds of steam pressure. The operating temperature is indicated visibly at all times by a temperature scale on the control. This temperature may be adjusted by the operator, either higher or lower, as may be desired.

The vulcanizer is furnished for bench operation and is portable. It can be connected to any lighting circuit and is furnished in 110 or 220 direct or alternating current voltage.

This is said to be an ideal machine for



Operating Temperature Indicated Visibly by Temperature Scale on Control.

any garage or repairshop, and is fully guaranteed by the manufacturer.

Write the Automatic Electric Heater Co., Warren, Pa., for descriptive literature and prices.

Dependable Service Assured With a Globe Simplex Compressor.

There are so many distinctive features about the new Globe Simplex two-stage compressors that it is difficult to know which to name first.

Fifteen years of experience on the part of the Globe engineers in designing and manufacturing small, two-stage compressors have resulted in the perfection of a compressor which is notable for the extreme simplicity and effectiveness of its design.

Before being placed in production, it was given rigid tests and observation in actual service during a period of more than four years.

The Simplex two-stage compressor is a vertical compressor, having the high and low pressure cylinders and the upper part of the crankcase cast en bloc, the

lower part of the crankcase being cast en bloc with a condensing chamber for separating moisture and any traces of oil from the compressed air. This also provides a base for the compressor which gives the 14-inch fan wheel ample clearance.

A needle valve for drainage has been provided for the condensing chamber, as well as a safety valve and a check valve with composition seat to prevent back pressure from the storage tank.

Driving at a speed which insures the maximum of efficiency and a negligible amount of vibration is made possible through the opposite travel of the two light-weight pistons and bronze connecting-rods which are driven by the double-throw steel crankshaft.

Of high-grade babbitt metal, the crankshaft and crank-pin bearings have laminated shims, with provision for convenient adjustment to take up wear. The piston pin is of hardened and ground tool steel, with bronze bearing.

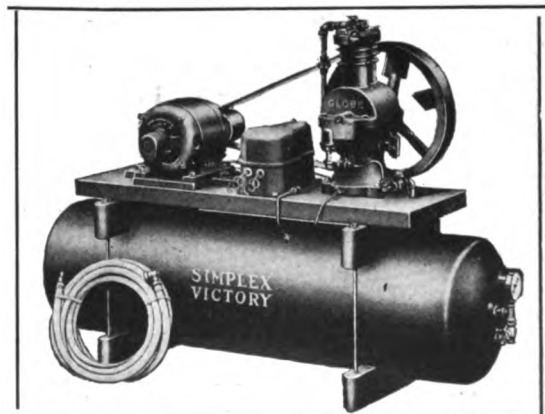
A single cylinder head is used for the two cylinders and carries all of the valves and the port between the low pressure and high pressure cylinders.

Only three valves are used in the Simplex two-stage compressors—one at the intake of the low-pressure cylinder, which is provided with a fine wire gauze strainer; one at the discharge of the high-pressure cylinder; and a single valve for the port, between the two cylinders. The three valves are vertical acting, and of approved automobile tappet type. Their construction insures a minimum of expansion space and also makes it impossible for any of the tappets to drop into the cylinders.

The lubrication, which is entirely automatic, is accomplished by the dipping of small pins into the lubricant contained in the bottom of the crankcase. Thus ample lubrication is given to all working parts, with no waste or excess of lubricant.

The maximum oil level is automatically controlled by the crankcase oil filler, which also provides for draining of the crankcase.

It is stated that laboratory tests, made with Simplex two-stage compressors, have



Only Three Valves Used in Simplex Two-Stage Compressors.

YOU CAN'T GO WRONG

On Kendell Piston Rings from a technical, mechanical or practical standpoint, as they embody advantages that override competition. A compression and oil ring all in one. Not only this, but numerous other features never before obtained, even radial expansion every thirty degrees, twelve points of expansion, THINK OF IT!

Made of our own special formula of soft grey iron, thoroughly seasoned, with a rapid seating surface that cannot score cylinders, a non-clogging oil wiping feature and to prove that these statements are beyond doubt, sold with a money-back guarantee.

Dealers everywhere are taking on our liberal sales proposition and we still have a few state distributor's propositions available, yours may be open, so: Better write or wire us today.

KENDELL ENGINEERING CORPORATION
Fort Wayne Indiana

Every Tire Dealer Using AMERICAN GARAGE & AUTO DEALER

Should get on our mailing list

Write or wire
for our latest
Bulletin just
off the press

It is a real Money Saver
and will be sent
upon request to
those in the trade

BROADWAY TIRE JOBBERS, Inc.
250 W. 54th Street, New York City

LET'S HAVE THAT NEXT ORDER!

**When you need a Doctor
Do you get estimates?**

NO! you engage a Physician in whom you have confidence. That's why you use F.A.A. ALUMINUM and CAST IRON MENDS. You have confidence in them in making permanent repairs, such as scored cylinders, cracked water jackets and aluminum castings.

**F. A. A. Aluminum and Cast Iron
Mends go straight to the job.**

**Distributors—Dealers—Agents
WANTED**

F. A. ALBERTUS & CO.
206 Ninth Street, Milwaukee, Wis.

Western Distributor
CARL M. ANDERSON, Vineburg, California



**ROSE Owners
Are Satisfied
Customers**

Easy action, quick results and long life are the features of the Rose Tire Pump that appeal to your customer.

From the first time he uses it he is your friend.

Satisfied customers are a big asset to every dealer and satisfied dealers are an asset to us. Our dealers like the Rose line because it allows a liberal profit and is one they can back with their unqualified recommendation.

Frank Rose Mfg. Co.
Hastings, Nebr.

Ask 'em to buy a Rose Pump and tell 'em about the patented valve and five-year guarantee. You'll sell 'em.

shown a power saving on the compression load amounting to 15 per cent.

To meet the requirements and convenience of various classes of service, Simplex two-stage compressors are furnished in two sizes with various equipment.

Every part and every complete Simplex compressor and equipment is rigidly inspected and tested before leaving the factory, and is guaranteed without time limit against defects in material and workmanship.

Detailed information concerning the different sizes of Simplex compressors and equipment will be promptly forwarded to those interested, by the Globe Mfg. Co., Battle Creek, Mich.

Wells' Automotive Wiring Manual Just Out With New Binding.

Information that should be of interest to all garages and auto-electricians has just been released by the Automotive Publishing Co., 448 South Dearborn St., Chicago., advising that it has recently finished the revision of its well known Automotive Wiring Manual to include blue-print, external, car-wiring diagrams from 1911 to date.

This manual is the original and only compilation of car-wiring diagrams in blue-print form, and is both nationally and internationally recognized as the official publication in its field. Considerably more than 25,000 copies are in daily service in this country alone.

In its new form, the manual is bound in a very attractive and substantial loose-leaf cover, to permit the easy insertion of later diagrams, which are furnished as issued at a very nominal cost.

The Automotive Publishing Co. also publishes Wells' Auto-Electricians' Handbook, which came out the first of this year, and which met with instant success among the garages and service stations doing starting and lighting work. This handbook gives the complete test and performance information, together with blue-prints showing the internal wiring connections of every make and model of starting and lighting equipment used from 1911 to date.

The price of the New Automotive Wiring Manual has been reduced to the same price as the handbook.

To those desiring not only the external car wiring diagrams, but also the internal diagrams with the test and performance data, the Automotive Publishing Co. is in a position to furnish the combined manual and handbook in one large volume of 1,356 pages, bound in a substantial loose-leaf binder of a ledger type. This combination volume contains all available information obtainable, and an attractive price is placed thereon.

Neither time nor money has been spared to make these publications the most complete, authentic, and correct possible, and they will be found of great value as part of the shop equipment in every garage and repairshop doing electrical starting and lighting work.

These publications are put out on a guarantee that money will be refunded if they are not found as represented.

BOOK REVIEW.

FORD CAR, TRUCK AND TRACTOR REPAIR, by Alfred A. Good. Published by McGraw-Hill Book Co., Inc., New York, N. Y. 229 pages, 5 ins. by 7 ins., completely illustrated; price \$2.

Believing it essential that the repairman, in order to turn out a really workmanlike job, should have a thorough knowledge of the mechanical and electrical action of every unit of the Ford car, truck or Fordson tractor, the author of this very instructive volume has gone into considerable detail in handling the various subjects treated.

Some of the chapter headings are: The Ford chassis and its component parts; assembly and repair of the Ford model T engine; the transmission and clutch; the rear axle; the front axle; the steering gear and brakes; general lubrication; general radiation; automobile fuels; electrical principles as applied to the Ford car; the ignition system; the Ford generator; the starting motor; the storage battery; the

Fordson tractor; the Fordson carburetion system; the Fordson air washer.

These headings give a very clear idea of the scope of the book. From these, it is seen that all of the essential parts are considered in the text and topics discussed upon which the repairman should be informed.

The drawings used for illustration are in such detail as to clearly indicate the points brought out in the text—a point that will be much appreciated by the amateur mechanic.

At the end of each chapter, there is given a series of questions and answers, bringing out many valuable points in connection with the construction, repair and operation of the Ford car, truck and Fordson tractor.

In short, this is a book which will be of inestimable value either as an instruction book, or as a reference book for the garageman or repairman handling repair-work on Ford cars, trucks and Fordson tractors.

Cedar Rapids Association Starts Campaign Against "Flivverboob."

The Cedar Rapids (Iowa) Motoring Association is planning an effective co-operation in the campaign launched by the American Automobile Association, of Washington, D. C., against reckless driving.

Reports of disastrous accidents caused by the activities of the careless motorist are received weekly by the Cedar Rapids Motoring Association.

The Cedar Rapids Motoring Association is a county organization, for which the following new officers have just been recommended and approved by the American Automobile Association: Jacquet Jackson, president and manager; Myron Prince, vice-president; Sam Martin, secretary and treasurer; S. Megan, assistant secretary.

The advisory board for July 1922-1923 is as follows: John Burianek, Jr., finance; John M. Grim, counsel; D. D. France, entertainment; C. R. Corrick, touring; Dr. E. Carmichael, membership; Harry Wyends, highway; S. R. Dyson, traffic.

"I *always* have good business" says
the garageman who uses

National Guaranteed Coupon Books

"Customers like them—they're so convenient—no stopping to make change. They like the discount made for cash, too.

There's no bookkeeping for me. I get my money in advance. No more disputes with customers."

Try National Coupon Books in your establishment, and watch the motorists "hit the trail" to you.

Samples will interest you.

NATIONAL CHECKING COMPANY

271 Chestnut St.

St. Paul, Minn.

KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by
THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.
Canadian Branch Factory at Woodstock Ont.

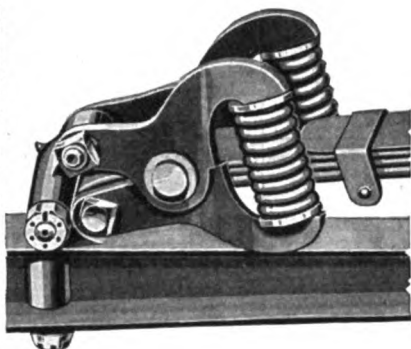
"I am very much pleased with the **AMERICAN GARAGE and AUTO DEALER**. I got one idea from you that will just double my sales in 1922."

WM. J. BRAUN,
Braun Vulcanizing Co.
Wahpeton, N. Dakota.



Star W-X Outshines All Other Ford Shock Absorbers

Give the greatest flexibility and comfort on either a normal or full load. Do not affect spring mounting of Ford Car. Simplest and easiest to install—car owner can do it himself. The biggest shock absorber ever offered at the price—\$8.00 per set of four. Three styles—No. 1 for Runabouts, No. 2 for Touring, No. 3 for Sedans. **DEALERS**—Here's a real money maker. Write today for full data.



STAR SPECIALTY MANUFACTURING CO.

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CHICAGO, ILL.



*A line that
will pay
you to sell*

SUPERBESTOS Folded and Stitched BRAKE LINING

outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.

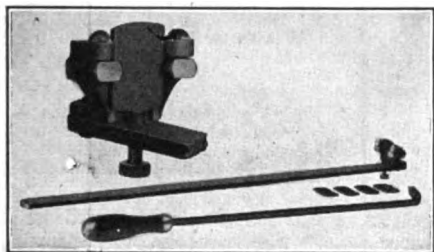


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Write for data and prices on brake lining, clutch facings, Ford Transmission lining, running board mats and packings.

Manufactured by
MIKESELL BROTHERS COMPANY
156 No. La Salle St., Chicago, Illinois
Plant and Works, Wabash, Indiana

BIG PROFITS IN REPAIRING SCORED CYLINDERS

No secret or mystery with the TORIT process



TORIT SCORED CYLINDER TOOLS

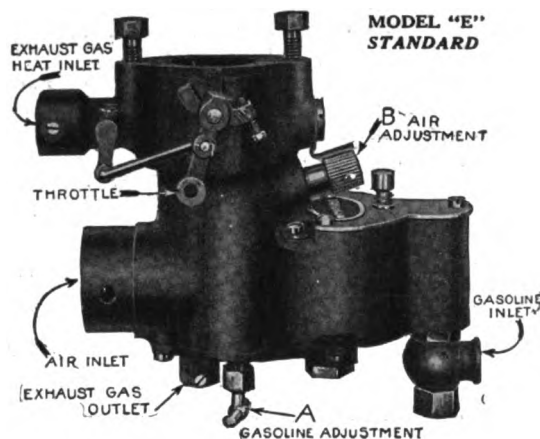
(Adjustable blade holder magnified)

TORIT tools refinish the cylinder to the same bore and surface. No new pistons, no regrinding. Easy work, big pay. Get your outfit now.

Price of tools, as shown, with instructions.....\$10.00
Filling-in metal, per pound..... 3.50

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Mfrs. TORIT torches, generators, preheaters, etc.
Distributors REGO oxy-acetylene equipment.



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Universal Satisfaction

POWERFUL—

ECONOMICAL—

SIMPLE—

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Trindl Piston Pins are the best pins you can buy. They are special heat treated which gives them a hard surface of about 1/32" in depth—accurately ground and tested to 1/10 of 1/1000th of an inch.

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Contracting and Engineering Co.
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"Service by the Golden Rule"

(AUTOMOTIVE ELECTRICAL
EQUIPMENT)

Write for complete particulars

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Jobbers—Distributors—Service Station

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Liquid Cooling Apparatus

Especially designed for automotive engines; a demonstrated success; apparatus does not require a fan for cooling the water. Eliminates trouble and annoyance of clogged cooling system; obviates danger of frozen radiator and tubes. Creates new method for displacing and cooling water. Dispenses with pump. Makes a neat appearance; can be used with any make or design of automotive engine.

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Handle practical R & M rim tool for demountable auto rims. For particulars write B. E. Woodcock, 303 Coal Exchange Bldg., Scranton, Pa.

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Enables you to make repairs and inspections in half the time; get better work done; give prompt, quick service; earn bigger profits; make a reputation for efficiency; attract more customers and keep them. You can't afford to be without a Topsy-Turvy Rack. A wonderful investment and the greatest business booster you ever had. Special inducement to first purchaser in each locality. Write today and be the one to win this.

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Auto Supplies, Tires, Tubes

Gasoline, Oil and Free Air

BATTERY SERVICE STANDARD PRICES

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Vulcanizing, Lay Works

PHONE 172

CYLINDER REGRINDING

Standard and Oversize

PISTONS

PISTON RINGS PISTON PINS
ALL WORK INSPECTED

With our **BU-NITE PISTONS**

Goes a **GUARANTEE**
of **SATISFACTION**

Standardized Prices
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Modern Equipment
Skilled Mechanics

Butler Manufacturing Co.
Established 1897 INDIANAPOLIS, IND.

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Build your own test equipment from my thoroughly tested plans, and save hundreds of dollars. Complete plans and specifications for following articles postpaid upon receipt of price:—Test bench \$1.50; Armature tester, \$1.00; Ignition tester for all systems, \$1.00; Magnet charger, 50c; High-rate discharger, 50c; Growler, 50c; Ford coil tester, 50c; Set of diagrams, showing interiors of nearly all coils, \$1.50; All of the above complete, \$6.00, including **FREE CONSULTATION SERVICE FOR SIX MONTHS.**

Satisfaction guaranteed.

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SATISFACTORY BATTERY?

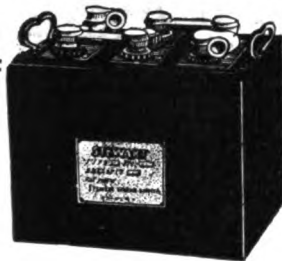
SATISFACTORY to the dealers
because of **PRICE**.

SATISFACTORY to purchasers
because of **PERFORMANCE**.

SATISFACTORY—all 'round.

Write for our Satisfactory and
Profitable Exclusive Selling
Plan with Dealers' Help.

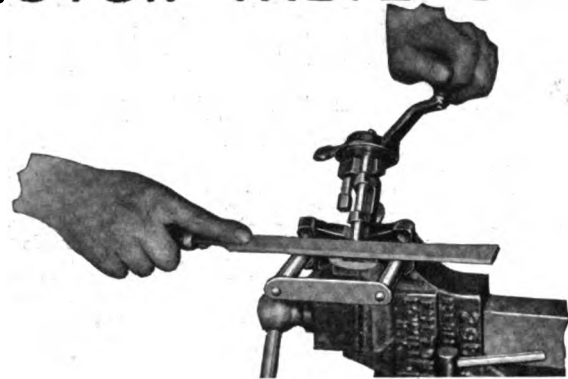
Stewart Storage Battery Co.
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Our exceptional selling plan and sales co-operation offer one of the biggest inducements ever known in the automotive line. Your territory may be open. We want to meet dealers alive to STEWART'S exclusive agency sales plan. Write us today, stating your business responsibility complete.

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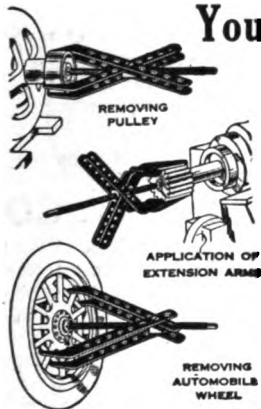


This new filing-refacer with its accurate guide bearing—its file held to a true plane—puts a true seating surface on even a warped tungsten valve. Set also includes complete reseater—shear cutter taking $1\frac{1}{8}$ " to $3\frac{1}{8}$ " valve seats, and four pilots. Skinner cutters stay sharp. Send for free treatise on valve work.

**Grinder
Accuracy at
a Hand-tool
Price**

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You Need One or Both These Gear and Wheel Pullers



The "LITTLE GIANT"

pulls any gear, wheel or pulley—anywhere—in a jiffy. Built on the only correct principle—produces maximum efficiency with minimum effort. Can't twist off or let go. Made of best grade drop forge steel. Adjustable up to 13" diameter. Price complete with extension arms \$12. Satisfaction guaranteed or money refunded. Order one today or write for data.

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This heavy duty puller is designed to cover a range of work upward from where the "LITTLE GIANT" and other tools leave off. Weighs 100 lbs.—open adjustment 40". Pulls heavy motor truck and car wheels, ship and aeroplane propellers, heavy fly and gear wheels, transmissions, etc., easily. Can't slip off work—no arm locks required. Price complete with wrench and handle, \$50. Where you have a job no other puller will touch you need a "Big Buster."



"THE HARDER THE PULL—THE TIGHTER THE GRIP"

Write for dealers' discounts and literature

Premier Electric Co., 3802 Ravenswood Ave., Chicago



The Pullman Sleeper (Curtains Removed)

A Pullman Sleeper

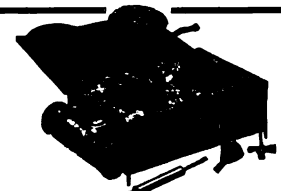
A PULLMAN SLEEPER CAN
BE MADE OF YOUR CAR

Send for catalogue of Beds, Camp Stoves, Tents, Etc.

VANDERPOOL CO.

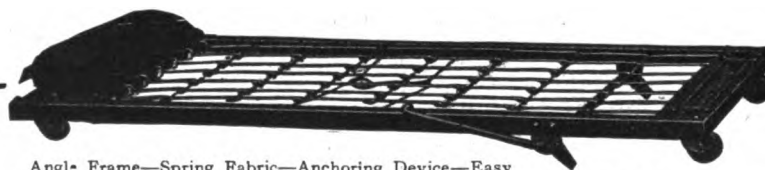
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Foster

Auto Repair Creeper
METAL CONSTRUCTION



Angl. Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

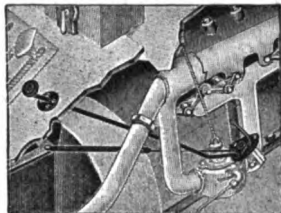
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\$5.00

Ask for the name of the Foster distributor in your territory.

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Trade Mark Registered

SOLDERING SALTS

for soldering all metals—just dissolve in water and the flux is ready. Harmless, quick-acting—just the thing for automobile repairs.

Buy it from your jobber in ¼ lb., 1 lb., and 5 lb. cans.

New Prices for 1922.

ALEX. R. BENSON CO., Inc.
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PISTON RING

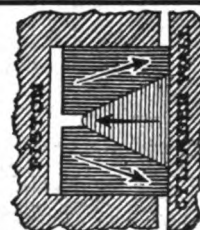
The Piston Ring guaranteed against warping or loss of tension through heat. Warranted to last the life time of any motor upon which they are properly installed.

Write today for full details.

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345

V-Plex Piston Rings



A Few Agencies Still Open

REPUTABLE mechanics know the value of side expanding rings. This statement is proven by our large business with repair dealers.

Over 90% of sales are repeat orders.

V-Plex rings embody many other special features of particu-

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Exclusive county and sectional representatives for this remarkable, self-adjusting-to-wear-in-all-directions ring are being appointed. Possibly the agency for your district has not yet been assigned. Find out. Write now.

KRASBERG PISTON RING CO.

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You Don't Guess the Answer

You READ It on the Blade

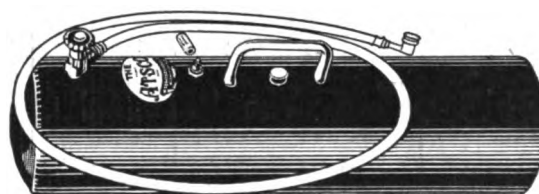
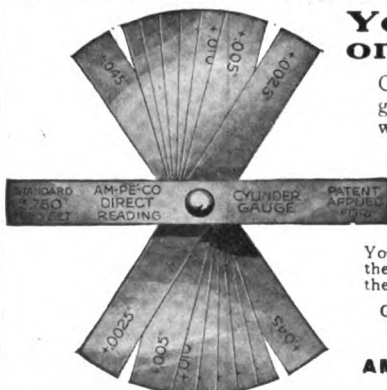
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The AM-PE-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

Get the whole story in our circular.
PRICE \$1.75

AM-PÊ-CO SALES CO.
Marshalltown, Iowa



You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

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The Sterling

HIGH RATE CELL TESTER



FINDS THE TROUBLE QUICKLY without removing the storage battery from the car.

Provides an accurate test for each individual cell. Saves attempting to charge a defective battery. Shows when a new battery is needed. Durable, simple, compact and effective.

Price, \$8.00 complete.

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Over 2½ million Sterling Electrical Devices in use today.

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CYLINDER REBORING MACHINES

World's Standard for Speed Accuracy and Reliability

Made in All Sizes from Small Hand Tools to Large Vertical Boring, Boring and Milling Machines.

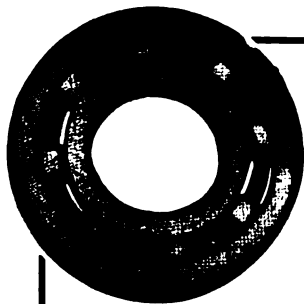
Capacities to Meet Your Requirements.

Write Today for Complete Catalog
Covering Storm Equipment

STORM MFG. COMPANY

Dept. E. Minneapolis, Minn.





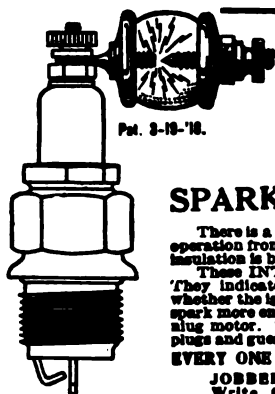
WESTERN GUARANTEED REBUILT BEARINGS

You can save 50% on replacement bearings by sending the old ones to us for rebuilding. Our rebuilt bearings are equal in all respects to new ones—they are fully guaranteed.

We will replace any used bearing you have with a Western guaranteed rebuilt—or, if beyond repair, will sell you a new or rebuilt bearing at a great reduction in price.

We are headquarters for rebuilt bearings, new ball and roller bearings, and steel balls—all makes.

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Pat. 2-10-'18.

Spark Plug Troubles Are Rare Occurrences

on the car equipped with

UNIVERSAL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon. These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

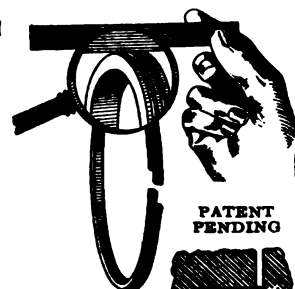
JOBBER and DEALER—Your profit is liberal.
Write today for our attractive proposition.

UNIVERSAL MFG. & SALES CO.

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CHICAGO, ILL.

INSTANSEAT seat Instantly PISTON RINGS



Dealers say—"It pays to handle INSTANSEAT rings because:

Customers desire *quick results*—

Preventing passage of excess oil
guarantees *against come-back jobs*—

Individual virgin grey iron castings
insure *good results after long usage*—

and because

Quality, prices, and discounts are beyond comparison.

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117 No. Jefferson St.

CHICAGO, ILL.

WATERVLIT SPIRAL EXPANSION REAMERS They Will Not Chatter!

Guaranteed
mechanically
perfect.

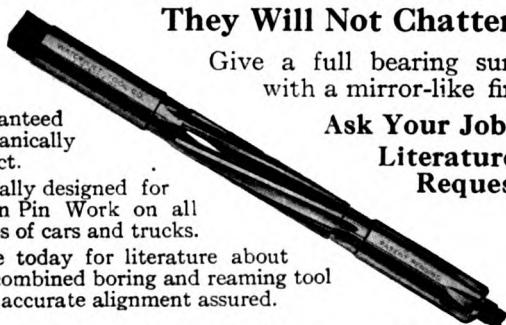
Specially designed for
Piston Pin Work on all
makes of cars and trucks.

Write today for literature about
this combined boring and reaming tool
with accurate alignment assured.

WATERVLIT TOOL CO., Inc., Albany, N.Y.

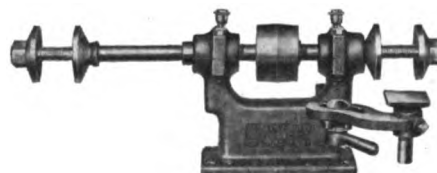
Give a full bearing surface
with a mirror-like finish.

Ask Your Jobber.
**Literature on
Request.**



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T. & L. Pulley

Here is your chance for a
high grade grinder at
moderate price. Cored
section castings. Self-
Oiling bearings. .40 car-
bon arbors. Square
threads. Pulley forced on
instead of set screwed.



No. 21-23

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MACHINE TOOL
COMPANY**

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INCREASE YOUR PROFITS BY MEETING THE DE- MAND FOR THE ONLY MONEY GUARANTEED BURST PROOF RE- PLACEMENT RAD- IATOR FOR FORDS.

The Jaffe \$100.00 Reward
Guarantee has a wonder-
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the trade. It means big
JAFEE sales for you.

Write for the JAFEE Yellow
Book and our new three-
color display signs, im-
printed with your own
name and address.

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CHICAGO, ILL.

**\$100.00
REWARD!**

The JAFEE RADIATOR COM-
PANY will pay \$100.00 reward
to anyone who can prove that
the core of any JAFEE radi-
ator can be damaged by
freezing.



Tires, Tubes, Storage Batteries,
Bulbs, Spark Plugs, Piston Rings,
Tools, Chains, Oils, Greases, etc., of
highest quality are available under
the Culp-Plan. If you buy such
merchandise commercially, write
for Culp-Plan facts, or ask any live
dealer—he knows!

George K. Culp, Inc.

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New York

(COUPON)

George K. Culp, Inc., Dept. ARZ,
56 West 45th St., New York City

I am interested in receiving full particulars of the Culp-Plan
for Dealers.

City

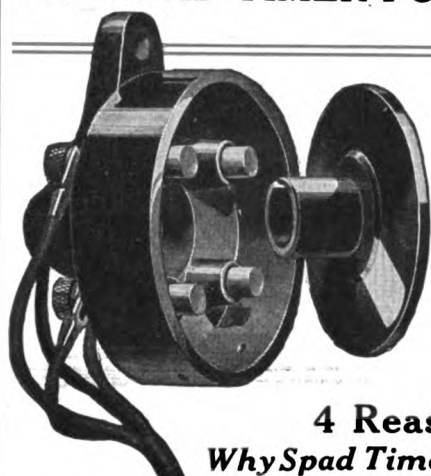
Street

State

Name

(Fill in these four lines in capital letters)

THE SPAD TIMER FOR FORDS



*"Built
Like a
Magneto"*

4 Reasons Why Spad Timers Are Best

1. Absolute freedom from oil assures a hotter spark.
2. Not affected by a wobbly camshaft.
3. Unique construction assures long life.
4. Manufactured of high grade insulating compound.

Quick, Easy Profits!

Agents, dealers, distributors: An exceptional opportunity to make good profits fast. Write for particulars today.

**\$2.50 List Price
in U. S. A.**

**West of Rockies
\$2.75**

Canada, \$3.75



**SPAD MFG.
COMPANY**
Inc.

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Pioneer Trailer Camps

Offer every garage man and dealer a splendid opportunity to "cash in" on the new and highly profitable recreation—

Auto Touring and Camping

Last year a million motorists enjoyed this "out-door sport." This year the number is conservatively placed at a million and a half. This new phase of the automobile industry is growing by leaps and bounds. It is up to you to get your share. We can help you do it. Write today for catalogue, prices and dealer's discounts.

Dept. C

Continental Auto Parts Co.
COLUMBUS, INDIANA

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ASK YOUR JOBBER TO DEMONSTRATE THE

CADY PISTON RING COMPRESSOR

IF HE CAN'T, WRITE US

WAGLEW MANUFACTURING COMPANY

SYRACUSE, N. Y.

A Big "Idea" Behind Big Sales!

Thousands of Accessory Dealers have found that the

POMEROY PATENTED ELECTRIC GASAFIER

leads the leaders.

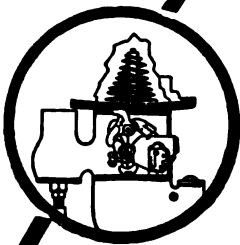
Now entering fifth year.

For easy, cold weather starting—it's there. Saves 15% gasoline! Takes the strain from the battery. Makes hill climbing easy. Lasts as long as any car lasts. The price is \$5.

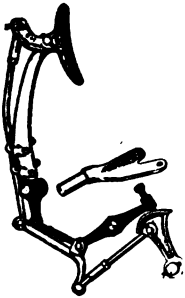
Of course, we can't see all of you, but we can tell all of you how to increase your profits at a season when other accessories are slow. Dealers in 38 states and Canada have found our proposition worth while.

Your territory is ready and you may get exclusive sale. Write without delay.

POMEROY ELECTRIC CO., Inc., Mfrs., 40 East Main St., Rochester, N. Y.



TWO FORD ACCESSORIES TO INCREASE YOUR SUMMER SALES

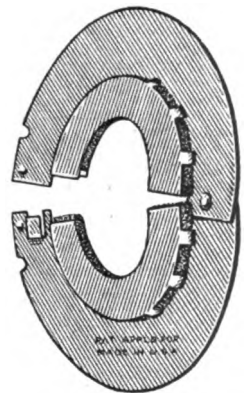


THE B & C NEUTRAL PEDAL

No more guesswork as to neutral position. The B & C provides a positive determined neutral position, independent of emergency brake connections. Quicker to start, quicker to stop, quicker to reverse with the B & C. Every customer who has a Ford will need the B & C and want it.

THE AUXILIO OIL SHIELD

Keeps the motor from overheating, prevents fan belt's slipping, by taking care of oil and keeping belts dry. Made of steel parts hinged and provided with catch for locking in position on crankshaft. Felt gasket absorbs and throws off oil before it reaches belt. Assures motor efficiency.



Write for prices today.

THE BURNHAM-COTE COMPANY
Holyoke Mass.



*Mends punctures
and blow outs
TO STAY
MENED.*

This is the original, the genuine, no heat, no cement, no gasoline inner tube repair. Patents, fully covering process, pending.

Notice—Dealers who are interested in securing the most profitable and aggressive sales co-operation ever offered on an automobile product will please write direct to manufacturers.

ROBERT M. BOWES CO.,

INDIANAPOLIS

BUYERS' REFERENCE

AIR COMPRESSORS

Brunner Mfg. Co., Utica, N. Y.
Champion Pneumatic Machinery Co., 3164 S. Chicago Ave., Chicago.
Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.
Globe Mfg. Co., Battle Creek, Mich.

AIR HOISTS

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

AIR TANKS

Air Tight Steel Tank Co., Pittsburgh, Pa.

AMMETERS (POCKET and DASH)

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, Ohio.

ANTI RATTLES (Window)

Autoquip Mfg. Co., 495 W. St. Paul St., Rochester, N. Y.

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H. P. Manly, 1010 S. Michigan Ave., Chicago.

AXLES (EMERGENCY)

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AXLE STRAIGHTENERS

The Unigarto Co., Ft. Wayne, Indiana.

BATTERIES

Stewart Storage Battery Co., Central Ave. at Sixth St., Marshfield, Wis.
W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

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BEARINGS

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Buckstaff Breeze Bracket Co., Lincoln, Nebr.

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The Kokomo Electric Co., Kokomo, Ind.

CARBURETORS

Marvel Carburetor Co., Flint, Mich.

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Storm Mfg. Co., Minneapolis, Minn.

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CYLINDER REGRINDING

Trindl Co., 2917 So. Wabash Ave., Chicago.

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Am-pé-co Sales Co., Marshalltown, Iowa.

ELECTRICAL REPAIRS

Sampson Electric Co., 2334 So. Wabash Ave., Chicago.

ELECTRICAL TESTING EQUIPMENT

Automotive Electro Technologist, Box 115, Fullerton, Cal.

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W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

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Friss Mfg. Co., 3416 N. Illinois St., Indianapolis, Ind.

ENGINE STANDS

Continental Auto Parts Co., Columbus, Ind.

FAN BELTS

Hide, Leather & Belting Co., 229 S. Meridian St., Indianapolis, Ind.

FIRE FIGHTING EQUIPMENT

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Continental Auto Parts Co., Columbus, Ind.

H. G. Pare Co., 1410 So. Michigan Ave., Chicago.

Storm Mfg. Co., Minneapolis, Minn.

Watervliet Tool Co., Albany, N. Y.

Zinke Co., The, 1323 So. Michigan Ave., Chicago.

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Pomeroy Electric Co., 48 E. Main St., Rochester, N. Y.

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Wayne Tank & Pump Co., Fort Wayne, Ind.

GEAR AND WHEEL PULLERS

Continental Auto Parts Co., Columbus, Ind.

Friss Mfg. Co., 3416 N. Illinois St., Indianapolis, Indiana.

Premier Electric Co., 3800 Ravenswood Ave., Chicago.

GREASE GUNS

Frank Rose Mfg. Co., Hastings, Neb.

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C. A. Shaler Co., 373 Fourth St., Waupun, Wisconsin.

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National Refining Co., 2003 Rose Bldg., Cleveland, Ohio.

OIL SHIELDS

Burnham-Cote Co., Holyoke, Mass.

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Mikesell Bros. Co., 156 N. La Salle St., Chicago.

PARTS SERVICE

North East Service, Inc., Rochester, N. Y.

PISTONS

Am-pé-co Sales Co., Marshalltown, Iowa.

Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON PINS

Burgess-Norton Mfg. Co., Geneva, Ill.

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PISTON RINGS

Butler Mfg. Co., Indianapolis, Ind.

Krasberg Piston Ring Co., 117 No. Jefferson St., Chicago.

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Leeseberg Machine & Mfg. Co., Postoria, Ohio.

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Continental Auto Parts Co., Columbus, Ind.

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Air-Tight Steel Tank Co., Pittsburgh, Pa.

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Frank Rose Mfg. Co., Hastings, Neb.

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Indiana Parts Co., Richmond, Ind.

Star Specialty Mfg. Co., 227-233 W. Erie St., Chicago.

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SIGNS

Flexlume Sign Co., 25 Kall St., Buffalo, N. Y.

SOLDER

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

SOLDERING FLUX

F. A. Albertus & Co., 206 9th St., Milwaukee, Wis.

Benson Co., A. R., Hudson, N. Y.

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

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M. W. Dunton Co., The, Providence, R. I.

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Allen Specialty Co., 2751 W. Lake St., Chicago, Ill.

SPARK PLUG INTENSIFIERS

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

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Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

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STORAGE BATTERY TESTERS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

TESTING INSTRUMENTS

Leich Electric Co., Genoa, Ill.

H. P. Manly, 1010 S. Michigan Ave., Chicago.

W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

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Dale Mfg. Co., 1323 S. Michigan Ave., Chicago.

F. R. Mfg. Co., Fairbury, Ill.

Leich Electric Co., Genoa, Ill.

McCullough Mfg. Co., 216 High St., Boston, Mass.

Spad Mfg. Co., Inc., 42-B W. 39th St., New York City.

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Broadway Tire Jobbers, 250 W. 54th St., New York City.

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International Stamping Co., 400 N. Leavitt St., Chicago, Ill.

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Robt. M. Bowes Co., Indianapolis, Ind.

Atlas Auto Supply Co., 680 W. Austin Ave., Chicago, Ill.

C. A. Shaler Co., Waupun, Wis.

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Turner Brass Works, Sycamore, Ill.

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Frank G. Hough Co., Chicago, Ill.

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Leo McDaniel Contracting and Engineering Co., Cairo, Ill.

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Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.

VALVE GRINDING COMPOUNDS

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WORK BENCHES (Portable)

Continental Auto Parts Co., Columbus, Ind.

Not Just ONE Profit But

→ 2-R-3 ←

When you sell a 2-R-3 TIRE CARRIER you not only collect one nice profit but pave the way for 2-R-3 more.



Model Y

Simply by showing the 2-R-3 Tire Carrier many car owners may become immediate prospects for a tire, a tube, a rim, and a tire lock; things that they need but did not know how to carry them.

Trouble on the road has convinced most motorists of the necessity of 2-R-3 spares. The motorist who only carries one is skating on the thin ice of the river of trouble, grief, annoyance and delay.

Our attractive and convincing display stand calls the motorist's attention to his need. The simplicity of attaching 2-R-3 Tire Carriers holds an appeal that makes easy sales.

2-R-3 Tire Carriers simply hook on the preceding tire. No tools required to attach. No bolts or nuts to bother with.

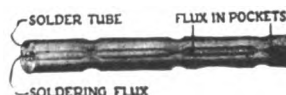
Made in two models, S and Y, for all sizes of tires. Prices range from \$2.50 to \$7.00.

If your jobber cannot supply you, write us direct.



Model S

International Stamping Company 400 North Leavitt Street **Chicago, Illinois**



SAVE WORKMAN'S TIME

with



Life for the workman is a race with the tick-tick of the clock. He'll be the winner if he uses Kester Acid Core Wire Solder in those soldering jobs—it's so easy to use—so effective in its work—so **superior**.

Use the coupon —
and see for yourself

Chicago Solder Co.
4210 Wrightwood Ave.
Chicago, Ill.

Am.
Gar.
8-22

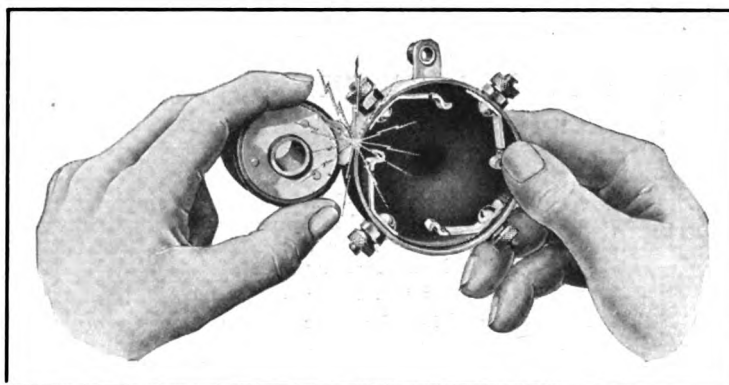
Chicago
Solder Co.,
4210 Wright-
wood Avenue,
Chicago

Gentlemen: Please
send me a free sam-
ple of Kester Acid
Core Wire Solder.

Name.....
Company.....
Address.....
City.....
State.....
Our Supply House Is.....

The Leich Magnetic Timer

Simple



Reliable

IT'S MAGNETIZED

The success of the Leich Magnetic timer has been made possible by the Magnetic rotor.

When the rotor is in operation, the contact springs do not rub on the insulation and therefore do not accumulate a film of insulation over the contact surfaces.

The contact springs engage only the raised portion of the rotor. When struck by this raised portion the springs do not jump away but are held tightly against the contact surfaces of the rotor by means of the magnetic properties.

A good and uniform contact is assured over a sufficient length of time to allow the coil vibrators to act properly. This makes ignition positive.

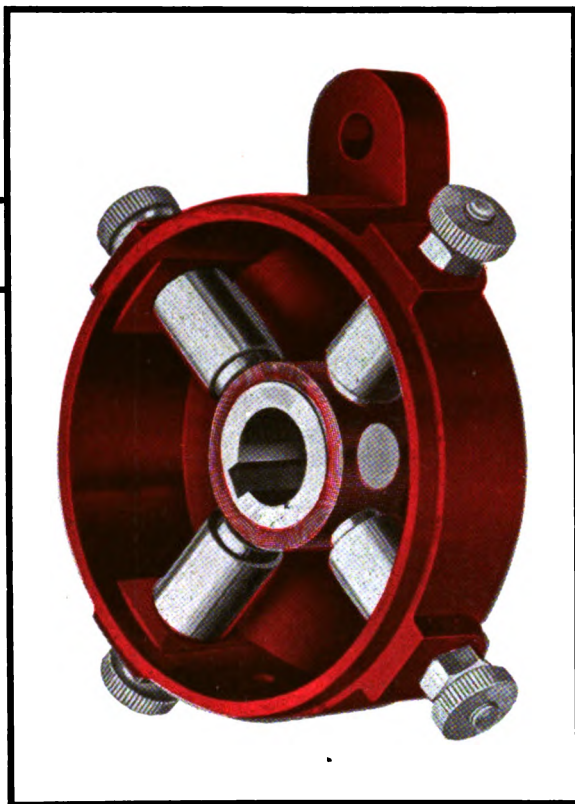
Wear and arcing are reduced to a minimum by the use of grease in the timer cup.

In the Leich Magnetic timer are combined means for positive electrical contacts and long life.

DEALERS, Now is the time to act. Have your customers equip their cars and tractors with Magnetic timers, —the timer that will give efficient service in cold weather.

Leich Electric Co.

Genoa, Ill.



Buying Timers on the Installment Plan

You can buy a lot of timers at prices below that of the DALECO but you will need a lot of them.

The original cost of a DALECO is a little more but it is the ONLY cost and your timer troubles are over.

The man who buys a cheap timer to save a little money is like the man who trimmed his dog's ears a little at a time "So as not to hurt him so much."

He ultimately pays a lot more and constantly suffers from loss of power, excessive gasoline consumption, and the endless annoyance of faulty ignition.

Bear in mind the buyer of a DALECO TIMER is positively guaranteed two full years of faultless Timer service at no additional cost and thereafter for the life of the car at a maximum cost of 50 cents per year.

If your motor is "missing" replace it with a DALECO.

DALECO

Trade Mark Registered

Jobbers and Dealers write our sales department today for full details.

Manufacturers
THE DALE MFG. CO.
1323 Michigan Ave.
Chicago, Ill.

Sales Department
THE ZINKE COMPANY
1329 Michigan Ave.
Chicago, Illinois



It's Spee-Dee In Its New Collapsible Tube

Good old Spee-Dee of the can—in a convenient tube—from which it comes out a ribbon of thick, creamy cleanser—fresh and clean. Handy to tuck away in your customer's pocket or the pocket of his car—enough for three dozen washes. Everybody will want Spee-Dee tubes. Show them in their "jackets" of bright yellow, red, blue and white—packed in attractive display cases—to your customers.

STATES CHEMICAL CO.
680 West Austin Avenue
Chicago, Illinois

**Handy Size
Tube**

*In cases of three
dozen—\$3.60. Re-
tail — \$5.40. A
profit for you of
50%. Great, isn't
it? Write.*

15¢



American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

SEPTEMBER, 1922

Vol. 13—No. 9.
10 Cents the Copy.
\$1.00 Per Year.



This Counter Display Will "Ask 'Em To Buy"

Write for it now. But, better still—ask for two—one for your counter and one for your window. You can't run around and show customers everything that you sell—but this display will tell every one of your customers that you sell Shaler 5 Minute Vulcanizers, and Shaler Patch-&-Heat Units. It's the best "Sales Stimulator" that you ever saw—a "Magnet" that will draw new customers into your store if you will merely put it in your window. It brings 'em in to buy.

SHALER

5 Minute Vulcanizer Is Nationally Advertised

The Counter Display will connect your store with our advertising, and remind your customers of Shaler advertisements which they have read in their favorite publications, at home. There is a big demand for Shaler Vulcanizers and Shaler Patches. Over 20,000,000 Shaler Patches were sold last year, and the demand is steadily increasing.

This counter display is but one of many Shaler Sales Helps which we send to Shaler Dealers FREE on Request. The Shaler 5 Minute Vulcanizer is one of the most profitable items that you sell, because every sale is but the first of a chain of sales of Shaler Patch-&-Heat Units for use with the Vulcanizer. Have you received our new Posters and Window Displays? If not—just ask for them.

C. A. Shaler Company, 358 Fourth St., Waupun, Wisconsin

Bu-Nite

STEEL BAND PISTON

It's a Leader—Used By Leaders— This Bu-Nite Steel Band Piston.

For it does just what a leader would have a piston do!

The Bu-Nite does not require as much clearance as an iron piston and at the same time possesses a remarkable efficiency, strength, rigidity in construction and is light in weight!

Expanding as it does in less degree than the cylinders, it allows more space between cylinder and piston for lubrication. Two solid steel bands particularly designed to properly function, and of a smaller diameter than the piston are cast within the skirt and control the expansion.



"So highly satisfactory that it would be a waste of time to tell you what I think of them."—"Howdy" Wilcox, winner of 500 mile event.

When the Bu-Nite is once installed, leaders know that they can have the desired speed—no piston troubles—because the Bu-Nite is perfect.

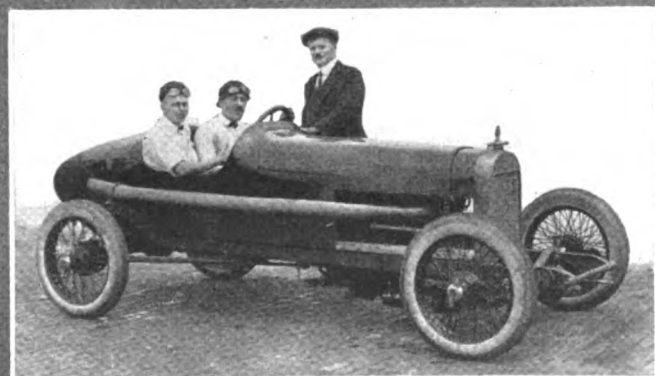


"Cannon-Ball" Baker, champion endurance driver of the world, places confidence in Bu-Nite Pistons.



Of course, further details will interest you. Add a leader to your line. Write now.

Butler Manufacturing Co.
3234 W. Washington St., Indianapolis, Ind.

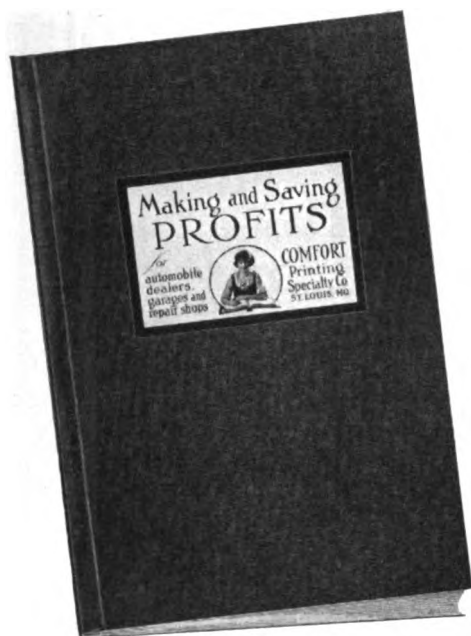


Arthur Chevrolet (standing),
is a booster of Bu-Nite
Pistons.



K. K. Kiser, designer of motor of
"Miss Illinois", which won Chicago
Pageant of Progress event, is enthu-
siastic about Bu-Nite Pistons.

Get ALL the PROFITS



This book is free

It is 7 inches wide by 10¼ inches long and is strongly bound in a brown cloth cover. It is built for hard use and printed in easy-to-read type. It is not merely a catalog, but gives accurate information on the best practices for any automotive shop. Comfort knows your business thoroughly—from A to Z. It matters not whether you are a dealer, proprietor of a garage or repair shop, Comfort's book, "Making and Saving Profits," will show you methods and ways to increase your profits.

It costs *nothing* to learn how. Simply fill in and mail coupon below to Comfort.

In a day or two you will receive the cloth-bound book illustrated on the left.

"Making and Saving Profits"

This book holds the solution of all accounting troubles liable to the garage, repair shop and automobile salesroom.

Fifteen thousand satisfied customers in the automobile field have profited through acting on the suggestions it contains.

No matter what YOUR problems are you'll find the answer in this book.

Comfort Printing Specialty Co. 109 North Eighth Street, St. Louis, Mo.

COMFORT PRINTING SPECIALTY CO.,
109 N. Eighth St., St. Louis.

Please send me your free, cloth-bound book, "Making and Saving Profits," for which I shall be under no obligation whatever.

.....
(Signature of individual making request and title.)

Below give business name and address, where book is to be sent. Please print plain and large.

Name

Street

City or Town..... State

Bu-Nite

STEEL BAND PISTON

It's a Leader—Used By Leaders— This Bu-Nite Steel Band Piston.

For it does just what a leader would have a piston do!

The Bu-Nite does not require as much clearance as an iron piston and at the same time possesses a remarkable efficiency, strength, rigidity in construction and is light in weight!

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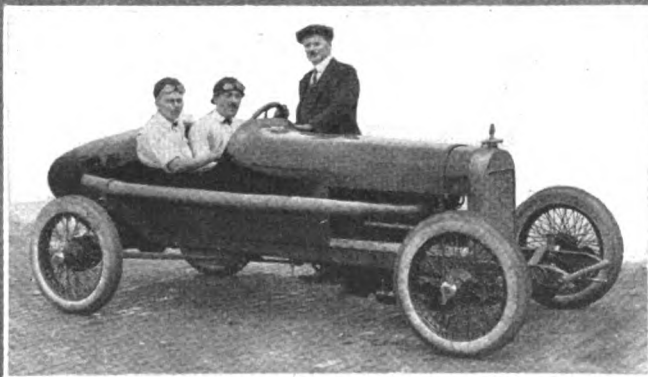


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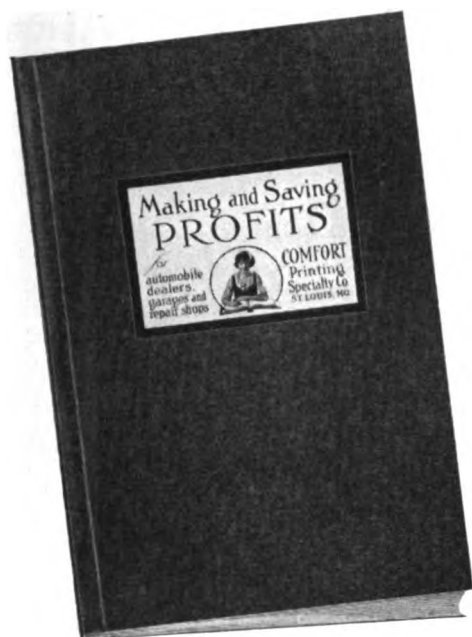


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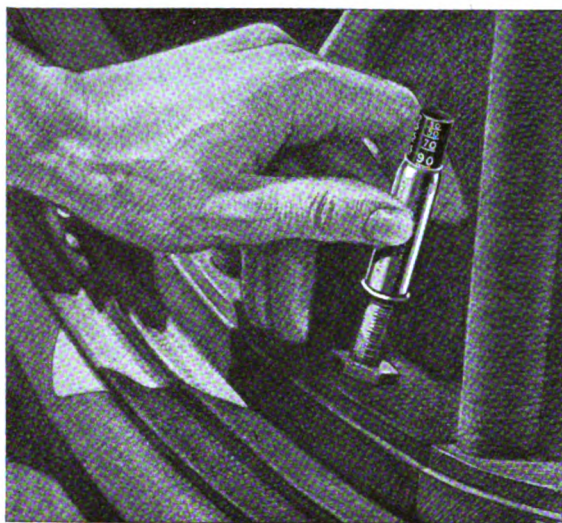
(Signature of individual making request and title.)

Below give business name and address, where book is to be sent. Please print plain and large.

Name

Street

City or Town State



If a Car Owner Wants Tire Mileage

*Tell Him to Buy a Schrader Tire Pressure
Gauge and USE IT*

No car owner can expect maximum mileage unless he keeps his tires properly inflated at all times.

He can't do this unless he owns a tire gauge.

The man who doesn't own and use a tire gauge, guesses about his air most of the time.

The idea of a tire gauge is to stop guessing about tire inflation.

Advise your customers to own a Schrader Tire Gauge, and if they don't own one to buy one.

Its use is simple; it is always accurate; it will last for years.

Order a stock now of Schrader Tire Pressure Gauges from your jobber. They are easy to sell because they are needed—and there's worth-while profit in it for you

Manufactured by A. SCHRADER'S SON, Inc., Brooklyn, N.Y.
CHICAGO TORONTO LONDON

SCHRADER

TIRE-PRESSURE-GAUGE

You Can Do a Good-Sized Business on Valve Caps, Dust Caps and Valve Insides

No man wants to drive around with his valves uncovered—no valve cap and no dust cap. Let your customers know that you have them for sale.

Schrader Valve Insides

Many car owners like to have several spare valve insides in the tool kit. Packed five in a metal box.

Schrader Valve Caps

Seal in the air. Half the cars you see need from one to four valve caps. Schrader Valve Caps in metal boxes of five are ready sellers when *offered* for sale. They are simple, effective and economical for sealing air in a tire.

Schrader Dust Caps

Quickly removed or replaced. Protect the valve from dust and dirt. Will not shake off. Combination Rim Nut and Dust Cap Bushing illustrated, provides for quick attachment and removal of Dust Cap.

CAUTION: Apply Rim Nut with wrench or pliers, but do not use either of those on the Dust Cap, which should be screwed on by hand only—not necessary to force Dust Cap tightly against nut, but only sufficiently to seat the Dust Cap.

Schrader Pump Connection

For use on foot pumps. Air pressure can be tested without removing pump hose from valve.

Schrader Valve Repair Tool

A useful little tool, handy to every man who makes his own minor repairs. Order a stock now from your jobber.



Manufactured by A. SCHRADER'S SON, Inc., Brooklyn, N.Y.
CHICAGO TORONTO LONDON

SCHRADER

TIRE-VALVE-ACCESSORIES

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, *Editor*

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AMERICAN GARAGE & AUTO DEALER, Inc.

116 South Michigan Avenue, CHICAGO

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Gallons pumped: 241,379
Cost of repairs: 75¢

On the Dixie Highway at Milford, Illinois, Mr. Louis Schaumburg, proprietor of the Dixie Garage, has owned and operated a Wayne Honest Measure Pump for the last six years.

In that time he has sold through the pump 241,379 gallons of gasoline. He has had to replace only one part—a leather washer. The total cost of repairs in six years was seventy-five cents.

Inside the garage, Mr. Schaumburg has a Wayne Oil Storage Tank, with pump attached, which he installed at the same time he bought the curb pump. The tank has been in use constantly. It has never been out of order.

Such loyal and profitable service is not unusual for Wayne equipment, however. Owners everywhere are obtaining similar satisfactory results. And shrewd buyers of gasoline pumps and oil storage systems are giving their judgment to Wayne.

Won't you let us tell you more about the equipment which has sold gasoline and oil so economically for Mr. Schaumburg? Write now for Bulletins 276-AGD 452-AGD and 35-AGD. There is no obligation involved.

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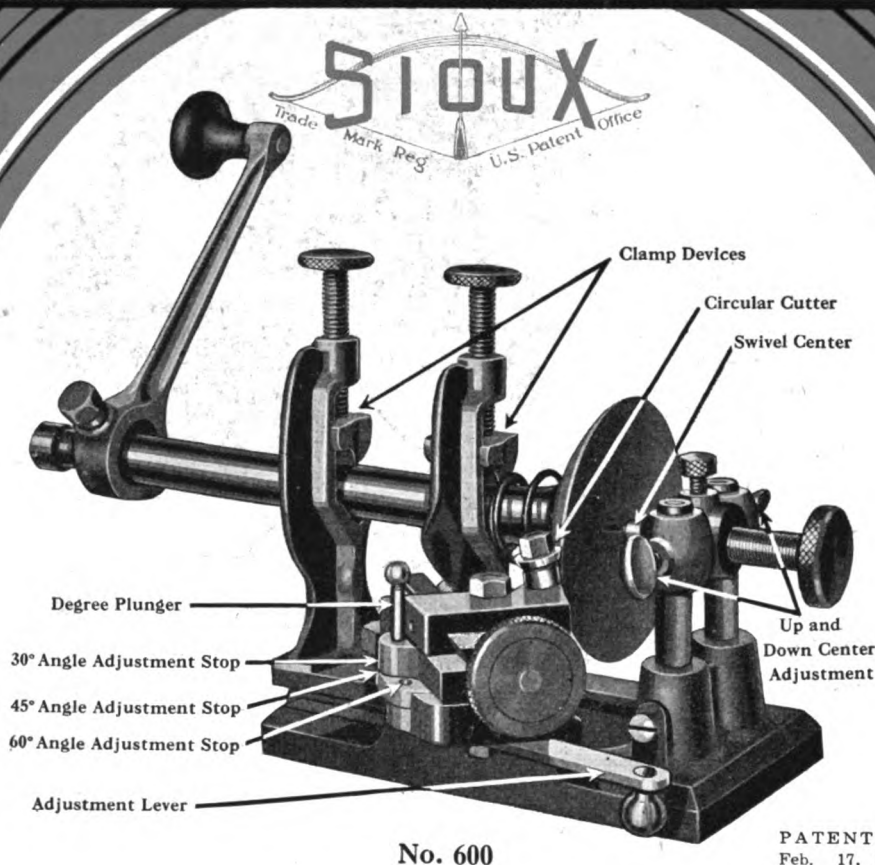
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Takes care of small jobs as well as the large. Refaces valves from $1\frac{3}{8}$ " to $4\frac{1}{2}$ " with either a 30, 45 or 60 degree angle.

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All Live Jobbers Handle Them

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SIoux CITY, IOWA

American Garage & Auto Dealer

*A Business Paper Exclusively for the "Small-Town
Automotive Trade"*

Vol. XIII. No. 9

CHICAGO

SEPTEMBER, 1922

Display Windows That Make Sales

You Don't Have to Have a Big Shop in Order to Prepare an Attractive Display Window—The Window Described in This Article Requires Only a Small Space and Yet Will Be Unusually Effective and Out of Ordinary

By Dale R. Van Horn

With a little spare time, any mechanic can prepare an attractive display window for the automobile showroom which will surpass the ordinary.

Motion creates public interest, and a striking display endowed with motion in some suitable form will compel the passersby to stop and gaze, while a similar setting, devoid of that motion, would fail in its purpose.

The scenic display window which is described in this article consists, briefly, of a suitable display model car supported on two jacks, in the midst of moving scenery. A moving roadbed, canvas drawn tight over two rollers and painted a drab to resemble the roadway, lies on the floor behind the window. The upper surface touches all four wheels of the car, and the power supplied the rollers which move the canvas also supplies the power which turns the wheels.

The jacks are required for the car supports. These may be cut to size from 10-inch square timbers, with a plank base as shown in the detail, Fig. 1. One rests on the floor at each end, directly under the axles, and slight grooves in the tops prevent the axles from working off.

To allow the canvas roadbed to pass the jacks, it is split in the center and each half is then slipped to one side on the rollers, leaving enough room in the middle for each half to pass the jacks. Flanges on the rollers, Fig. 2, both at each end and each side of the center—hold the canvas halves in place and prevent them from running off. These

"For Business Helps," Says Dealer B., "You Cannot Beat A. G. & A. D.!"

Once there was a dealer in a little country town,
Who couldn't understand why weekly sales kept sliding down.
"We're going to the bow-wows," is the song that he would shout.
"I'm losing money every day,—I might as well sell out.

"I haven't sold a car for months, there's nothing to repair;
The only time that folks stop here is when they need some air.
My bank book plainly tells me that my business is sick;
I'll be a Bolsheviki unless something happens quick."

One day a salesman asked him if he'd ever chanced to see
A copy of the magazine called "A. G. and A. D."
He ended up by taking a subscription for a year;
And now when he is shouting, it's a different tune you hear.

"Say, here's the thing," he tells you,
"that has put me on my feet.
It's full of helpful articles that simply can't be beat.
I drop my tools the minute that I see it in the mail,
'Cause it's made my place the busiest garage along the Trail."

flanges may be made of sheet iron or tin and, after tacking in place, the inner edge is turned up at right angles to the length of the rollers. The flange itself should not be more than 1/2-inch in height.

One of the rollers is supplied with a small grooved wheel, to which it is keyed, and from this wheel runs a

round belt to a large reduction wheel, which is in turn belted to the motor furnishing the motive power. The size of the motor used for this set of rollers need not exceed 1/2-horsepower in size and, if conditions are good, a smaller motor may be used. The size of the motor will depend somewhat upon the speed at which the canvas is to be run and the weight of the wheels of the car being displayed.

This is for an ordinary display window, not exceeding 10 feet in width and 20 feet in length. For a larger space, the motor size will vary accordingly. The rollers should be long enough to extend practically across the intervening space between the window glass and the back curtain or the blind or background, determining the width of space allotted the window.

These rollers are supported in 2-inch wooden bearings, which are nailed or bolted to the floor, with holes bored through them of the same size as the iron rods which form the roller shafts. The matter of greasing will not cause any trouble for, if the wood is thoroughly soaked in oil before use, neither the wear nor the use of the lubricant will be noticeable.

Fig 3 shows an end view of the vertical curtain, which is mounted at the back of the car and which forms the background and, incidentally, most of the novel effect. Upon this is painted suitable rustic scenes, all blending into one, so that, as the canvas is rotated, no abrupt change occurs.

Two rollers are required for this

background, and the installation does not differ radically from the rollers on the floor, save for a proper support for the extending arm which supports the upper ends of the rollers. These rollers need but one flange each, at the lower side. Due to the weight of the painted canvas, they should be at least an inch broad and, to prevent possible crumpling, it will be well to sew in small steel wires on the back side for at least half its lower width, to hold it firmly upright.

The motive power for this curtain need not be as strong as the unit required for the roadway, since all that is required is to keep the canvas in motion. To keep the effect as nearly natural as possible, this set of rollers should be rotated at a slower speed than the other pair, since distant objects always move into, and out of, the range of vision more slowly than those nearer at hand. This mechanism will require a larger step-down train of wheels also.

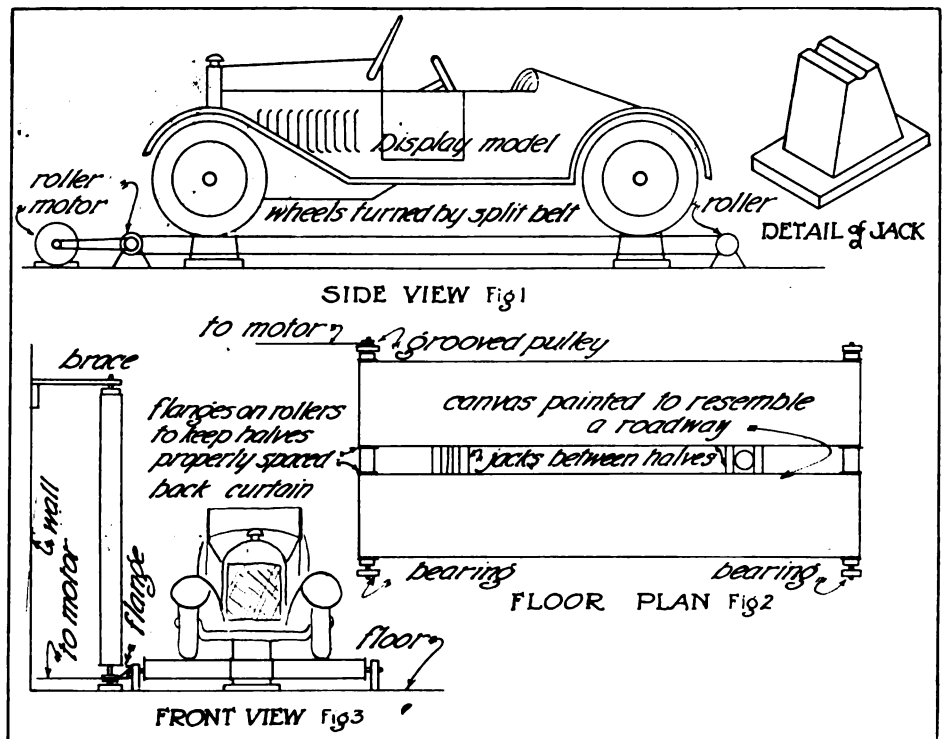
The canvas used may be of light material or, if the space to be covered is relatively small, even good muslin may be employed, since this is far cheaper and for the purpose involved is quite as effective. The vertical cloth should be covered with trees, shrubbery and an occasional open space, to give it depth.

It will be well to employ the services of a scenic painter, since the cost will be immaterial in view of the work rendered and, since none of the work will be subjected to close and critical scrutiny, the general effect alone will be required.

The horizontal canvases may be painted a dull drab, and an occasional stone or obstruction sketched in to break the monotony. It will be well to pay more strict attention to the edges of the sheet than the center, since this will be cast in shadow, when properly lighted, to cover up the slit in the center.

Of course, some additional trimmings will be required to hide the ends of the canvases and the rollers. Some real shrubbery, aptly set at each end of the window, will hide this and make the roadway appear to lead on into the thicket and back into woods. These details will best be left for the man in charge, since the proper effect can be obtained only by sizing up the particular job.

It is evident that such a display will create the greatest impression at night.



Plan for an Ordinary Display Window Not Exceeding 10 Feet in Width and 20 Feet in Length.

A dummy should be placed at the wheel to make the scene complete. It may be garbed in conventional attire or only in rough outing togs. A cap pulled well down over its face, and a small electric fan placed in front of the driver's seat and supplied with current from a storage battery will create an artificial breeze, which may be made apparent by supplying the dummy with a loose kerchief or duster and seeing that an end or two is left free to flap in the wind.

Slight stretching of the cloth when subjected to the pull of the rollers may be overcome by relacing or sewing now and then, or by arranging one of the rollers in each set so that it may be moved back and forth. This may be done by attaching the pieces serving as bearings to a timber, and either holding this in place by a block and tackle, of the light sort, tied to a support out of sight or simply holding the timber down with two lag-screws.

This brief outline simply suggests the use of such an idea and it may be worked out to such extent as the one undertaking it may choose.

"The Highway City" Is Name Accorded Chillicothe, Missouri.

Among the many interesting replies received by the National Automobile Chamber of Commerce to a card questionnaire on motor camp sites in the

United States, is one from Chillicothe, Mo. This city with a population of 12,560 has no less than 28 national, inter-state and state highways passing through it. 23,520 tourists' cars carrying over 100,000 persons visited or passed through Chillicothe in 1921, purchasing merchandise and supplies amounting to over \$241,000.

Motor Truck Committee Getting Results From Civility Campaign.

Greater civility on the part of the 1,000,000 motor truck drivers in this country is anticipated from now on, by reason of the excellent response that has been made to the educational campaign being carried on by the national motor truck committee of the National Automobile Chamber of Commerce.

The pamphlet that is being used in the campaign, "Common Sense on the Highway," has already reached a circulation of 125,000 copies among truck manufacturers, dealers and fleet operators. Requests for additional copies are being received daily from some of the largest truck users who comment upon it in highly favorable terms.

The pamphlet is illustrated by cartoonist Clare Briggs who shows, in his inimitable style, that courtesy is as cheap as the air and why drivers should move to the right to accommodate faster moving vehicles.

Remind Customers of Accessories

Hiding Goods Won't Sell Them; Often an Attractive Display Arrangement Will—Fred Believed in Keeping His Customers Reminded of Their Automotive Needs by Ingeniously Placing Accessories So They Would Be Seen

By M. S. MacLeod

"What's the idea, Fred? Starting a jewelry store?"

"No, just getting my stuff out where people can see it. They won't buy stuff if they don't know you have it."

"But why go to all the trouble of fixing up a lot of velvet lined trays and polishing up a lot of things like this? Must be a lot of trouble to keep them looking so clean?"

"Yes, there is a little work connected with it, but the results more than pay for any little trouble you go to."

I had dropped in at Fred's place to get some valve caps. Fred is a live accessory dealer, and I always did like to go there. He keeps his place nice and clean.

I got my valve caps all right. Fred handed them out to me on a tray with an assortment of small accessories on it, all neatly arranged and polished like a mirror—pressure gage, spark-plugs, motometer, several screwdrivers, some small wrenches, and a number of other small items.

Fred loves to talk about his business, and I smelled a good story, so I let him talk.

"Yes," he went on. "You see a lot of accessory dealers who are good fellows and all that, but when you go into their store you feel as though you

they have to do is get stock in at the back door and pass it out at the front, but things have changed in the last few years. You've got to get out and hustle for what you get now."

"You're right Fred," I returned, "but just what good does this tray and polished-up stunt get you? What I mean is: Does it get you any more business, or does it just leave the impression that you run a clean, orderly business?"

"Well, take yourself for example," said Fred. "When you came in here all you were going to buy was a couple of valve caps, but you bought a pressure gage in addition. There are lots of people that way. They want things, but you have to bring it to their attention when they are in the buying mood. Then they take it."

Let me say a word about the trays Fred has made. They are about two feet long by one and one-half wide, lined with velvet. He calls them companion trays. If you were to come in and ask for some polish, he would hand you the polish on a tray filled with sponges, automobile soap, a chamois skin or two, and all the articles he has in stock for the cleaning of a car.

Suppose you want a certain kind of wrench. He has a tray filled with a variety of wrenches—all sizes and shapes. Monkey wrenches, offset wrenches, socket wrenches; in fact, nearly every style that is made.

Fred has another good system that builds trade

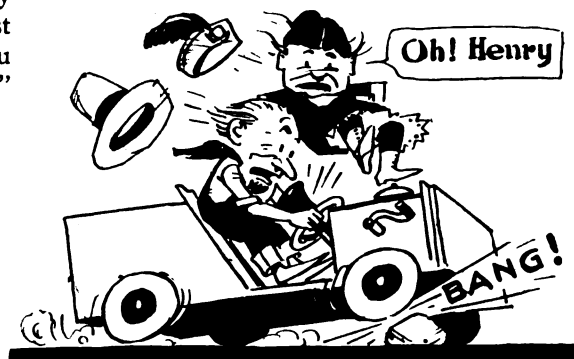
and gains friends for him. While I was standing talking to him, a man drove up in a sputtering, gasping old car of the vintage of 1914.

"I wanta get a coupla spark-plugs," he said.

"Yes, sir," said Fred. "What kind do you use on your car?"

"I don't know," the man replied. "The old tub is acting up fierce. Jumps and coughs, and don't hit right. Guess she's about ready for the old Fords' home."

"Mind if I take a look at it?" asked Fred. "May be something wrong other than the plugs."



"The Old Tub Is Acting Up Fierce," the Man Replied.

"Go as far as you like," said the man.

They went out, and Fred snooped around the engine for a minute or two. Then asked the man how long it had been since he put a new timer on it. This disclosed the fact that the man had never put on a new one.

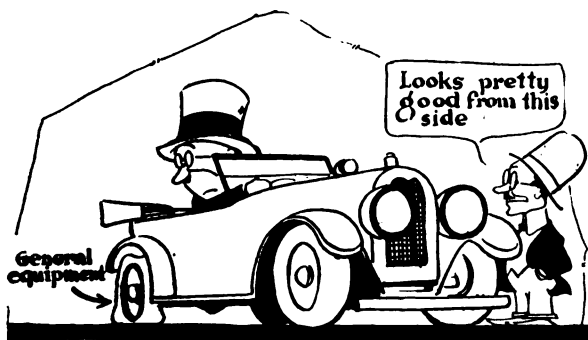
"Let's see how she would work with a new one," said Fred, as he got out a timer.

He put on the new timer, adjusted it, and turned the motor over. It snorted, squared up its shoulders, and pawed around like an anxious fire horse.

"Well I'll be darned," said the man. "Here I've spent enough money on new plugs to buy half a dozen timers, and never did know what was wrong with it. Guess I'll leave that timer on. How much is the bill for it?"

Now Fred might have sold that man a spark-plug or two, and the man would have gone on his way satisfied—but that is not Fred's way. He sells you what he thinks you need and, in the majority of cases, he is right. He is an old automobile mechanic and knows cars.

Fred has a good slogan. Above the door of his store is a sign reading, "The Store of Personal Service." He



Don't Overlook Chances to Sell Extra Equipment Needed.

were going into a repairshop. Junk all over the floor, and things not kept clean. And a lot of them keep all their stock hidden away in boxes or in the back room.

"Now what in Sam Hill is their excuse for being in the accessory business? They seem to think that all

lives up to that slogan in every transaction.

Fred has any number of little tricks up his sleeve for attracting the good will of his customers. He told me about one little stunt he pulls off that works out very nicely.

When a lady drives up to his place for something or other, he asks her if the shifting lever on her car is too far away for her to get at handily. In a number of cases this is a cause for complaint from the ladies. Fred puts on an extension, asking the lady to try it out and give him her opinion as to whether it is a practical thing for a car like the one she is driving. He asks this as a special favor, never saying a word about selling it to her. In nine cases out of ten, he sells the extension to the shifting lever.

"It's a funny thing," said Fred. "I sold 14 of those extensions last month just through that very same stunt, and several other ladies have come in and asked for them."

But I couldn't get the tray proposition out of my mind. "Have you any idea as to how much business you have gained through the use of those trays?" I asked him.

"Yes. I keep an account of the extra sales I have made. Last month I sold something over \$360 worth of accessories by this method alone."

You must admit, Mr. Dealer, that a stunt like that, with such results, is worth trying.

"Since you're looking for a story, I might as well tell you about the stunt I pulled off with the people next door. I got them to let me fix up one of

their display cars with a lot of accessories. I put bumpers on it, spotlight, extra tire and cover, windshield wings, a cigar lighter, running-board mats, motometer, and several other things that were needed.

"The only advertisement I use is a small sign saying: 'Accessories on this car are used by courtesy of Fred's Place.' Last year I sold the equipment as it stands on that car, netting me over \$400. Of course, the car people are glad to have a car fixed up like that, and it sure is a good advertisement for me."

Are you putting your goods out where the people can see them, or are you hiding them in a back room on a shelf? "Ask 'em to buy" by displaying goods attractively and where they will get the attention of your customers.

Choosing a Suitable Site for Garage

How About a Bridgehead Location?—An Ohio Garageman Has Profited by Placing His Establishment at the Point of Densest Motor Traffic—His Experience Proves That Business Invariably Follows the Motor Traffic

By C. M. Adams

Anyone, who knows anything at all about business, realizes that one of the most important preliminary steps toward the success of any retail venture is that of choosing a good location. Big enterprises have gone to considerable lengths to ascertain just which are and which are not good locations.

An organization operating a national chain of cigar stores, for example, has developed an elaborate system to determine this with scientific precision, and department stores, drug stores, and other retail establishments have adopted a more or less similar system for the same purpose. But the garageman, particularly the garageman in the small town, has not been able to do this because he lacks the necessary equipment and personnel.

"You ought to get a place downtown," a friend, rated locally as an authority on such matters, advises him. "Some place that is handy and where people can see your goods."

So he proceeds to buy—usually a site which some skillful real estate man makes seem to fit these vague specifications. That is why the experience of Victor D. Shumard, of Milford, Ohio, should prove interesting and helpful, because he has chosen

a location of definite garage value—one at the end of a bridge.

During the war we heard much from military experts about the strategic value of bridgehead positions, and those in France who actually took part in defending or attacking such positions know just what a tremendous advantage is enjoyed by a force holding one, simply because this position commands the crossing of the river. This is precisely the principle which

Shumard has utilized so effectively.

Milford is a town of 1600, 15 miles northeast of Cincinnati, divided roughly in half by the Little Miami river, and Shumard's garage is located at the eastern end of the bridge spanning this river. This site was formerly occupied by a livery stable in the days before the price of gasoline became a subject of universal concern.

The livery stable was floated away and wrecked in the flood which swept Ohio in 1913 and, after it had lain idle for a time, Shumard acquired the land and erected his garage.

"He must be crazy." "Whoever heard of anybody putting up a garage in a place like that?" "Why he's clear out of the business section!" These were some of the more moderate comments made by local critics.

But Shumard went steadily on with the building of his garage, finished it, secured the Ford agency, and is now doing an unmistakably successful business in cars, tractors, trucks, and accessories, due, largely, to his good judgment in choosing a location.



Shumard's Garage, Milford, O., Located at Eastern End of Bridge Spanning Little Miami River.

The Law, The Facts and The Garage

Customers Who Habitually Let Accounts Run for Months and Then Dispute Accuracy of Statements Rendered Are "Thorns in the Flesh"—But Be Careful About Making Statements of Credits to the Merchants' Associations

By A. F. McCarty

Just as nearly every retail business has a Bert Caldwell, so is there a Sam Smithers who is a thorn in the side of the dealer. Sam was the thorn which pricked the flesh of Elwood Brown, of The Brown Garage & Auto Supply Co.

Smithers was one of those fellows—all too common—who buy on credit, permitting an account involving a large number of purchases to run for months, many of the items being very small. Then, when settlement time arrives, he disputes the accuracy of the statement rendered or claims it has been paid in part, and much tedious explaining and demonstration become necessary to prove the store's figures correct. On the occasion to be narrated, Sam ran true to form.

"Say, what's the matter with this statement?" asked Smithers, belligerently, coming in to settle.

"Nothing's the matter with that statement, Sam," said Brown, determined that for once he would eliminate the long discussion and argument which invariably characterized settlements with Sam Smithers. "That statement is absolutely correct."

"Look here, Sam, if you will recall it, we have had an argument with you every time you came in to settle your bill, and in no case have you found us wrong. I don't say that we never make a mistake but, as it happens, we never have with you. As for your account now and this statement of it, we have checked it and re-checked it until we are absolutely sure it's right. Now there's your bill; are you ready to pay it?"

"But look here at this item for inner tubes——"

"Nothing doing today, Sam, in the argument line. Time to quit it! That bill is absolutely correct!"

"I can show you where——"

"No, you can't, Sam. We keep books; you don't."

"Well, I'm not going to pay that bill!" exclaimed Smithers.

"All right; but I presume you will if we sue you, Sam. I'd much prefer to make my proof of that account in court anyway."

"Sue and be damned!" shouted Sam, defeated for once in his efforts to argue, and he left the store in a great huff.

However, Brown permitted several days to go by without bringing the

It's True! It's Just Published for You.

"I'm certainly done," said Number One, "With all of these foolish trade papers."

They're simply a joke, and I'd quickly go broke

If I tried their impractical capers.

"Now I bought one today, and the best I can say

Is they've sure got a cover that's pretty.

But every blamed word just applies to the bird

With a great big garage in the city."

"Here's the matter with you," spoke up Number Two,

"It's the wrong magazine that you're buying.

Get one you can use—one with real small town news

About what small town dealers are trying.

"Read A. G. & A. D., and you'll surely agree

That its policy couldn't be fairer;

For unlike any other, from cover to cover, It's just meant for the small town repairer."

matter to an issue in the courts. Even then, all he did about it was to make a report to the merchants' association of the town on Sam Smithers.

As do most of the organizations of the kind, the merchants' association had a bureau or clearing house for the exchange of information between the members relating to the credit or lack of credit of customers or would-be customers. And to that bureau the Brown garage rendered this report:

"Smithers, Samuel J.; \$58.93; disputes account; habitual; refuses payment; we will sue."

This report served the purpose it was intended to serve. It gave other members of the association the information about Sam Smithers possessed by Brown, and the others acted upon it. In other words, without exception, the retail stores of the town thereafter

refused credit to Smithers, and only a few days passed before Sam tumbled to the fact that the action was concerted.

As Sam was not dishonest and did pay his bills—though only after argument—he felt aggrieved over his sudden loss of standing with the dealers, and he looked into the thing. Of course, some one had to spill the beans and tell him how it happened, and when he heard it he was more than aggrieved—he was mad.

Still more, he consulted a lawyer about his rights. The lawyer first advised and then was instrumental in bringing a suit against Elwood Brown for \$5,000 damages for libel!

When the papers were served upon him, Elwood Brown, figuratively, went up in the air. "The darn stinker!" he exclaimed. "After trusting him for months, just because I wouldn't argue with him, here he sues me for damages!" And he hurried to George Updyke.

The attorney examined the suit papers and found that Smithers had filed with his complaint a copy of the by-laws and rules of the merchants' association and a copy of Brown's report on him; and that he was asking damages on the ground that he was the subject of a "malicious printed publication which tended to and did blacken his reputation and expose him to public hatred, contempt and ridicule"—the exact language of the law books defining libel.

The lawyer's opinion—prepared as it was for the use of a garage proprietor—is fittingly reproduced here:

First, Brown's report was true, and the truth is always a good defense in a libel suit, except in a few states where the statutes provide otherwise if the statement or communication is unnecessary and malicious.

Second, Brown's report was made without malice and for the actual interests of the one making it, in common with the interests of and according to a duty owed to those to whom it was made. As such it was a privileged communication so long as not unneces-

sarily published. In this case the merchants' association records and data were guarded carefully and were accessible only to members.

Third, merchants have a right to organize for mutual protection, generally, and may exchange confidential information as to the credit of persons dealing with the members. But this does not rest on the broad rules applicable to mercantile rating agencies, in whose records the merchant asking credit of wholesale houses is exposed to the public view. The rights of the retailer to publish reports on the

credit of a non-trader—an ordinary customer not in business—are much narrower than those of the mercantile agencies.

When the case came to trial, and Sam Smithers had to admit on the witness stand that Brown's report was substantially true, Updyke brought the trial to a speedy close without the necessity of putting in any further defense. The court ruled strictly in accordance with the lawyer's advice to Brown and directed the jury to find for the garage.

From the whole affair it was plain

that, for the future, reports to merchants' associations should be made with extreme care; should always be true and never be made as the outcome of a quarrel so that malice might be shown.

And that was all the merchant got out of it, for Sam Smithers still owed the Brown Garage & Auto Supply Co. \$58.93, and it looked as if another lawsuit would be required to collect it—Sam, after failing to get his damages, being more hard-boiled than before, and it was unlikely he would pay the bill without a fight to the finish.

Choosing a Suitable Site for Garage

(Concluded from Page 12.)

Some of the things that his critics said were true. For example, the location was distinctly out of the accepted retail business section. Locations which were deemed best for this purpose were practically two squares away and the peculiar layout of the streets made the distance seem even greater.

There was only one residence near it and the neighborhood had been left almost "high and dry" by one of those shifts in popular favor which often play such tricks with real estate values. But for a garage, the location has proved to be one of the best because it is at the motor traffic center, not only of the town but of the entire section.

The situation is this: Three main highways tap the section—the Cincinnati-Chillicothe pike turning eastward, the Cincinnati-Columbus pike running northward, and the Wooster pike leading southwestward. In addition, there are a half dozen county and township roads, giving access to local territory, and all these not only join in Milford but are linked together by this bridge over the Little Miami.

To get to Cincinnati along the Cincinnati-Chillicothe pike, cars must cross this bridge. To get to Cincinnati along the Cincinnati-Columbus pike, cars must cross this bridge. Cars must cross it in going from local points east of Milford to local points west of Milford, and the result of all this is that motor traffic is concentrated at this bridge.

There are other bridges. Upstream there is one three miles away, and four miles downstream is another, but both

are reached by inferior roads, at one side or the other, which necessitate a detour of several miles from the direct route. So, the traffic comes and goes over this bridge—two or three bus lines, a half dozen truck lines, private cars and trucks, reaching a rate on Sundays of from two to three hundred vehicles an hour. All of this means more business for Shumard.

The national cigar organization previously referred to rates its prospective locations according to the density of pedestrian traffic past them, but, to the automotive dealer, the value of a location depends directly upon the volume of motor traffic, for the man who buys gasoline and accessories is not the man on foot but the man in the car.

Of course, a good location has not been the only reason for Shumard's success. The best location in the world will not put over a business run without regard to certain other fundamentals. He has given good service, used vigorous and intelligent merchandising, and has advertised. However, other automotive dealers have done all this and have attained only average results.

For them, particularly those considering moving or establishing new quarters, what Shumard has done should prove of direct value—that is, finding the center of motor traffic density and then setting up an automotive business as near to this center as space can be secured.

It is not always at a bridgehead. Sometimes it is at a crossroad or fork some distance from town. Sometimes it is at a point where a favoring grade

dictates the flow. But the center is always there. Take a map, study it to see where the lines of motor traffic in your territory converge, and then mark this spot for your location.

Critics may laugh and forecast failure as they did for Shumard, but success will come, as it came to him, because motor business invariably follows motor traffic.

12,229,975 Barrels Gasolene Output for May of This Year.

The greatest production of gasolene in the history of the oil industry occurred in May of this year, according to data compiled by the American Petroleum Institute and submitted to the Senate committee on manufactures, which is investigating the industry. The output was 12,229,975 barrels of forty-two gallons each. The highest previous production was in September, 1920, when 10,806,693 barrels were produced.

In spite of the unprecedented production, however, the amount of gasolene available in refinery storage on May 1 of this year was said to be only 82 gallons for each of the 10,500,000 automobiles registered on January 1, as against an average of 87 gallons for each of the automobiles registered for the years 1918 to 1921.

Although the demand for gasolene varies more than 100 per cent between seasons of maximum and minimum consumption, it is necessary for the oil refineries to operate on practically a uniform basis throughout the year.

Otherwise it would be impossible for the industry to accumulate sufficient stock to meet the peak demand, the committee has been told.



Current Comments and Observations

By The Editor

It's a Good Business.

Heavy production of automobiles still continues according to reports from the factories. Each month shows a most substantial increase over the corresponding month of last year. July production was 38 per cent more than July of last year and August about 50 per cent more than August, 1920.

With the strikes that have been hampering industry for the past few months out of the way, leaders in the automotive industry are predicting that the close of the year will see all records for production smashed, including that of 1920 of 2,205,000 motor vehicles.

Of course, the large production means continued and increased business for parts and accessory manufacturers and in their turn the dealers and garages throughout the country. And there we are!

* * * *

The "First Class" Mechanic.

"Wanted—Automobile mechanic; must be first class." This is the type of advertisement that of late frequently appears in the want columns of local newspapers, particularly in the larger cities. It is evidently a recognition of an increasing demand on the part of automobile owners for real competent service when they entrust their cars to the garage or service station for repairs or inspection.

"The trouble with the average garage mechanic," said a recent visitor to our office, "is that he is not a real mechanic. He has not served an apprenticeship as a machinist, but has picked up some knowledge of motors by puttering around them.

"It is surprising that people will trust their cars in which they have invested from \$1,000 up to garage repairmen about whose ability and skill they know nothing. A man will do that although he would be mighty particular and 'fussy' about employing any other kind of workman or professional man on jobs where much less property value is involved."

The thoughts expressed by this man, who by the way is an expert machinist, are worthy of serious consideration by those engaged in servicing motor cars and trucks.

It is not difficult for workmen to obtain information regarding the proper and efficient use of tools and methods of doing work. The trade publications carry much informative matter and ideas as to latest practices. Study combined with practical

Coming!

If you are now handling battery repair work or contemplate doing so in the future—you are going to be very much interested in the series of articles which will begin in our October issue on the subject of storage batteries.

This series of articles has been prepared by S. E. Gibbs, M. E., Superintendent of Shops, Des Moines University, Des Moines, Iowa, and will include the following:

How and Why of the Storage Battery,
Battery Parts and Construction,
Lead Burning,
Plate Construction,
Methods of Assembling Batteries,
Charging and Forming,
Charging Equipment,
Troubles and Remedies,
Testing Equipment,
Shop Equipment and Arrangement.

Don't miss one of them! For Mr. Gibbs is thoroughly familiar with approved shop methods in battery manufacturing and repair and will present, in this series of articles, a wealth of practical, interesting and valuable information.

experience will do much in improving a workman's ability to turn out good work—and likewise increase his earning capacity.

It's workmanship that counts with the motor car owner and makes him a regular and consistent patron.

* * * *

On to "Normalcy."

This month witnessed the return to work of strikers in both the railway shops and the coal mines.

"The whole industrial machinery of the country is ready for a forward movement unprecedented in our economic history." This is the opinion expressed by Secretary of Labor Davis.

"American industry," said he, "has overcome the last obstacle in the way of the greatest economic revival the nation has

ever known. We have succeeded in avoiding a drastic reduction in the high wages which obtained before the period of depression, and we have kept the general wage level within a few per cent of what it was at its highest."

So the onward march to "normalcy" is again being taken up and it is to be hoped that there will be no long halts along the line of march.

* * * *

Business Conditions Are Right!

The period of marking time is over! We are now entering fall months—the season of the year that business prophets have declared will see a most decided quickening of the business pulses.

The sound reasons for the optimism that has been displayed in the past few months are now quite apparent.

It is expected that the farmers will harvest a crop valued at more than seven billion dollars—an increase of over 20 per cent above last year's crop valuation.

This purchasing power when released, as it will be, will have a decided effect upon many lines of business.

Wages apparently have stopped going down. Steel companies have given unskilled labor a 20 per cent wage increase. Jobs are available for practically every man who wants to work.

This increase in employment of labor augurs well for an increasing of business in the retail field. Consequently, manufacturers are finding an increasing demand for their products and at better prices.

The banks are in a very strong position and there is money enough to meet all demands for credit.

Last but not least, the coal and rail shopmen's strikes are settled so that manufacturing and transportation may be resumed unhampered.

Thus the prospects for fall business in every important industry looks unusually good and business generally is more optimistic than ever before.

Let's go! "Ask 'em to buy"—and ask 'em to pay. Above all, give service, value paid for, and courtesy. Then they will come again and send others also.

Some Business-Stimulating Ideas

Some Ideas Used in Indiana Service Stations for Increasing Sales and Giving Good Service—"If Your Salesroom Is Far Back from the Street Move Your Show Windows Out to It," Said Philadelphia Dealer, and Did It

The Ford sales and service stations, of Danville and Clayton, Ind., maintain that, if proper emphasis is placed upon the word "Service" in their business, the public will take care of emphasizing the "Sales." The proper service is one where the dealer takes an interest in the things in which the public is interested.

For May 29, at Danville, and May 31, at Clayton, arrangements were made for a free picture show—and it was not on automobiles. It was a picture show and some valuable lectures on seed-bed preparation by men who are expert in that business. The attention of the farmers in the neighboring communities was drawn to it, bringing a large crowd of interested people—and incidentally advertising the Ford more quickly than if the dealers were to canvass the community for sales.

I. L. Galbraith, of Lafayette, Ind., has increased his sales force by appointing the general public to be his salesman. He advertises the Columbia car as follows:

"Salesman's Commission Paid Anyone Who Sells This Car."

"To any man, woman or child who receives an order for our new automobile, we will pay in cash a salesman's commission, which ranges from \$35 to \$100. A bona fide proposition. Someone is going to be paid this commission."

In this manner he plans to make two sales, where otherwise it would have been only one, if any.

The H. M. Bahls Hardware Co., of Lafayette, Ind., that handles the Mansfield tire, made a special sale of their tire for the week, June 24 to July 1. It ran advertisements in the local newspaper, stating that any purchaser of a Mansfield during that week, who would present the advertisement at the time of the purchase would receive credit for a dollar.

In this way, they were able to test out the strength or drawing-power of the advertisements. It started the tires to moving in a more effective manner than announcing a certain percentage or reduction on the tires.

The Parker Tire & Rubber Co., manufacturers at Indianapolis, Ind., in starting

one of their branch stores at Lafayette, Ind., for selling direct from the factory, thought it best not to advertise a special sale with a certain reduction in the price as an introductory offer. They presented the reduction in a two-fold manner.

At first they offered ten dollars for each old tire that was brought in on a purchase, it mattered not what the make, the size, or the condition might be. In addition to this there was a discount. The one exception to the rule was that, when a purchase of a 3½-inch size was made, only five dollars would be allowed on the old tire. This brought in the old tires, with the assurance that the Parker tires would be used at once—besides having the reduction.

The McKinsey Tire & Vulcanizing Co., of Frankfort, Ind., desired to offer their regular vacuum cup tire at a reduction. Rather than give the straight money reduction, they desired to offer it in the form of additional merchandise without any charge. So, for a limited time, they gave one "Ton Tested" tube free with each purchase of a regular vacuum cup tire.

In this way, more money passed into their cash register and more merchandise was taken off the shelves for use, without any greater loss than if the regular reduction had been made.

The Boone County Tire Store, of Lebanon, Ind., wanted to draw the crowds of automobile owners to their store for a display and a special offer of their fabric and cord tires which they propose to make. To do this, they offered a tube patching outfit free to every car

owner calling at the store on Saturday, May 13.

Many sales of tires were made that would not have been made otherwise. Then, too, by getting the names and addresses of the automobile owners, they would be able to make use of direct-mail advertising, if they so desired.

Realizing that the local newspaper published a morning edition, which was mailed to all the neighboring communities as well as the rural subscribers, the Shipley Hardware Co., of Lafayette, Ind., has appealed to this class of people for trade in automobile tires and accessories, by offering to mail to any purchaser the desired merchandise free, within a radius of 100 miles of Lafayette. This saves the farmers a special trip to town for something for the machine, and incidentally draws new business to Shipley's store.

The Guarantee Tire & Rubber Co., of Kokomo, Ind., wanted to increase their sale of Sealfast, the patch for tubes, as well as their general business. To do this, they offered to patch the tubes free for each purchase of Sealfast at its regular price. This gave the motorist a garage service free, and incidentally led to the sales of tires and accessories.

"Portable Show Windows."

"If your salesroom is far back from the street, move your show windows out to it." That's what an enterprising automotive equipment and tire establishment in North Philadelphia has done. Its shop is not only a long distance from the sidewalk, but is also down an incline. So, to give the motoring public an opportunity to see what it has for sale, the concern has had two huge

display cases—"portable show windows"—placed close to the sidewalk.

What Are You Doing?

"What are you doing?" makes the best advertising and sales talk possible. Nobody likes to do business with a firm that is doing nothing. The firm that is doing business always gets more business, for people always follow the crowd. If Tom Jones knows that John Smith does his automobile business with your garage, he will come there for his, too. How are the people to know



Philadelphia Concern Places Two Huge Display Cases "Portable Show Windows" Close to Sidewalk.

what the firm is doing, unless the firm tells them about it?

C. F. Peterson, the Ford dealer at Columbus, Ind., looked over his sales records on June 12 and found that he had sold 197 cars since the first of the year. That meant more than a car each day, not counting the Sundays and the legal holidays. "That's *some* record for a town of this size!" thought Peterson. "I believe I'll tell the folks about it!"

The next day his advertisement in the local newspaper was headed by the striking statement: "197 Ford Cars Sold Since January 1, 1922." This started many of the people to saying, "It seems that everybody is buying a Ford around here"—just what Peterson wanted them to think in order to create more sales.

Ed Calhoun, the man in charge of the painting department of the Columbus Buick Co., turned out 17 cars in 18 days, a remarkable feat, he thought, for that place, so an advertisement of the firm included this statement: "Seventeen Cars in Eighteen Days by Lykglas Auto Renewal System." This started the owners of old cars to thinking about having their machines made like new, since it could be done so rapidly.

Use Customers' Names.

What sort of a customer list have you? What kind of citizens trust to your judgment of motor cars and motor car accessories, to the extent of patronizing your place of business and of driving the kind of cars you sell? "Some pretty good citizens," you say, "some of the best known in the community, and the most respected."

Well, then, why not make capital out of the fact? Why not let the good reputation of your customers, their reputation for knowing how to do business well and demanding the same knowledge of those who serve them, work for the furtherance of your business.

You may answer that already you have the effect of their good-will—which is true enough—but it isn't the direct, sales-compelling method that may be followed without offense to customers already dealing with you.

A simple means of making use of this customer prestige is that adopted by the Beck Automobile Co., of Saginaw, Mich. This concern advertises each separate car

sale. A recent advertisement of this sort announces:

"—Another Packard, the 19th this month, was delivered today to Clifford A. Lilley, a Packard single six touring."

Mr. Lilley is pleased with the publicity, or it is likely he would not have given his consent to the publication. He has many friends, probably, and the car is brought to their favorable attention.

It is read in thousands of homes, this matter-of-fact statement, and doubtless in hundreds of homes where the purchase of a motor car is being considered, so that it is entirely possible that the fact that a certain definite, well known individual has purchased this special make of car has its effect in bringing in new prospects.

In Pontiac, Mich., the Oakland Motor Car Co.'s Michigan agency undertook a similar line of publicity recently, to support a strong endeavor toward making the Oakland the predominant car in the city where it is made. Names, pictures and letters from local owners of the Oakland were made use of in this campaign.

The man who had driven an Oakland for some months was induced to set down on paper his experience with the car, and some well known citizens were featured in the campaign. Incidentally, many of these were selected for the weight their names would have over the extensive farming territory surrounding the city. The campaign was productive of unexpectedly large results.

Like setting a concrete sales aim in the number of cars to be sold in a month, which was commented on in these columns some months ago, this plan is really a method of "taking the public into the confidence of the dealer." It adds a personal touch of man-to-man which goes much farther than stereotyped statements in print as to the merits of cars or goods.

Unusual Use for Windshield Glass.

Plate glass is no small item of expense in building a garage and, as the huge doors of most public garages are subject to rough usage, none but the heaviest and most expensive glass will stand the "gaff."

J. C. McLanahan, a Ford dealer of Collinsville, Ill., solved the problem thusly:

All large pieces of broken windshield glasses were saved and, when the door frames were complete, the fragments of glass were cut into uniform squares and fastened in the frames, thus making a sturdy door that admitted ample light.

A large window was constructed in a like manner, and the dealer found himself well repaid for the little time spent in collecting and saving the glass.

Easy to Handle Barrels Here.

Until it installed a special runway in its oilhouse, the Garvanza Hardware Co., Garvanza, Cal., found the unloading of barrels of oils of various kinds a nuisance. It was necessary to call a salesman from the floor



Convenient Way to Handle Oil Barrels.

to assist in placing the delivered barrel. Then a narrow runway was built from the unloading platform to the further side of the interior of the oilhouse.

The barrel is now unloaded on the platform and tapped. Then it is turned on its side and rolled along the runway to the interior of the oilhouse, where it rests on a platform or frame—that is merely a continuation of the runway. One man can handle it.

A "Jack Frost" Mailing.

If the dealer will watch the weather closely and time his mailing just in advance of the first cold snap of the season, a "Jack Frost" circular is practically certain to get fine results. The Scully-Norris Motor Co., 14th at Lawrence, Denver, Colo., used such a circular last winter, with the result that it packed its premises with "Jack Frost" business when the first cold wave hit the city.

Scully-Norris mailed the circular the afternoon before the cold wave was forecasted for Denver. The cold wave came in the night, and motor owners, with cold weather needs forced upon them, were ready buyers of the advertised accessories.

The circular featured a heater, giving the first two pages to it. Then came a third page with other needs mentioned and priced.

The first page of the circular had a poem—a parody on a well-known verse of Whitcomb Riley's:

**"When the frost is on the pumpkin
And the fodder's in the shock,"
Just install an Arvin heater
Which your dealer has in stock.
Spread a laugh on Old Man Winter,
Though the price of coal has soared;
Turn the damper on the Arvin
And it's summer in your Ford.**

The heater was pictured and described, and the price including installation stated.

The third page read:

"Jack Frost further suggests—

"Alcohol—Pure, high grade and efficient.



Windshield Glass Cut in Squares and Fitted Into Door Frames.

No charge for testing and inspection to ascertain your requirements. Price per gallon, 95 cents.

"Hood and Radiator Covers—Best grade, felt lined. Price, \$4.

"Kick Plates—Installed in running boards to prevent snow and dirt from soiling inside of car. Price, each, \$2.

"Moto-Meter—Will save you time, worry and repair bills. Price, \$3.50.

Water Pump—Keeps water in circulation under high pressure, preventing freezing in winter as well as to cool motor in hot weather. Price, \$12.50.

"Chains—To prevent skidding, incidental accidents and repair bills. 30x3½ Weed chains, \$5; 30x3½ Rid-O-Skid, \$2.65.

"Weather Strips—To prevent circulation of air through openings around foot pedals and emergency brake lever. Price, 95 cents."

The great volume of business which this circular sold for them, Sculley-Norris, of Denver, didn't hesitate to attribute in large part to the timeliness of the distribution. Most automobile owners opened the letter when they already felt winter in the air.

Just as with his winter overcoat, Mr. Average Man is pretty apt to wait until he feels the need for the articles in the atmosphere. There is always a big volume of accessory buying when the first cold wave strikes, and the business which uses direct mail advertising at the psychological moment is certain to cash in on a lot of it.

Selling Plans.

When a man goes on the official records as having purchased a car, the postman coming to his home has plenty to do. Piece after piece of mail comes to tell the man of some article, accessory or service that will bring economy, or more satisfaction in handling and caring for that car. The competition through the mail is terrific. The day is gone and forgotten when a seller of needs of the motorist can feel that he has a private audience with the car owner. Dozens are trying to get his favorable attention.

In Los Angeles a group of dealers have co-operated in a plan that is worthy of consideration, for it aims to remove a cluttering of the prospect's mail box and to influence him to keep in mind each dealer's goods or service.

If each of these dealers were to reach the prospect separately by mail, it would mean that the prospect would receive four pieces from accessory dealers, six from spring and bumper dealers, four from top shops and so on through 41 different lines to a total of over a hundred pieces. That would mean a straight route to the waste paper basket and an expense in total to the advertisers that would be prohibitive, to say nothing of the detail work required for each concern to watch for prospects and to send out the pieces of mail.

These hundred-odd dealers have co-operated—competitors and non-competitive lines—to prepare a catalogue of 96 pages in

strong covers. It is not only a catalog but a directory that the prospect will do well to retain against the day that he will have to call on some one of those concerns.

It is the method of sending the directory out that impresses the prospect. He receives in his mail a heavy flat parcel that causes him to wonder as to its contents. It bears on the outside the title of the book, "Automobile Row." When the prospect strips away the covering of the parcel, he finds to his surprise an open-end jacket of tin.

That arouses his interest and is assurance that this book will not immediately be consigned to the waste paper basket. He



Catalog Is Enclosed in Open-end Tin Jacket.

slides out the book that is inside the tin jacket and, turning a few of the pages, sees several titles that interest him. A few of the many are:

Automobile distances from Los Angeles.

Traffic laws of Los Angeles in a nutshell.

Los Angeles buildings.

Report of automobile accidents.

Automobile insurance record.

Gas and oil record.

Greasing record.

Tubes purchased.

These pages of information and blanks for keeping records of important data are an incentive for the man who owns a car to hold onto the directory. There are a number of city and outside road maps that form another inducement. In between pages of information and forms are advertisements of the patrons of the directory. And this announcement explains the book:

This book is presented with the compliments of the business men whose advertisements appear herein. Its contents, including traffic laws, road maps, general

information useful to automobile owners, the space for gasoline and oil expense records, tire records, etc., have been carefully compiled to give the best possible service.

The metal cover which is supplied with this book will make it possible to keep it in your automobile in good shape at all times for handy reference.

Loose'y inserted in the book are a couple of cards, one of which is a credit allowance of \$1 on a car-cleaning and polishing job, an inducement aimed to bring in first-time patrons. The other card is a membership card presentable at stations operating under the name: "Club Service Stations." This card entitles the bearer to a reduction of one cent per gallon on gasoline and five cents per quart on oil as compared to regular prices.

Tire's Wearing Qualities Measured by Energy Storage Capacity.

The quality which enables a tire to stand the rough usage of thousands of miles of travel according to Dr. W. B. Wiegand, of Montreal, director of manufacture for the Ames Holden McCready Co., is due to the fact that well vulcanized rubber has several hundred times greater energy storage capacity than any other structural material.

This property renders it of the greatest value in the absorption of the shocks of the main traveled road. Its energy can be changed into friction heat, and it can also be increased by adding to it certain substances.

Automobile Shows Open Jan. 6 at New York and Jan. 27 at Chicago.

Dates for the two national automobile shows have been decided upon by the National Automobile Chamber of Commerce as follows:

New York, January 6-13, at Grand Central Palace.

Chicago, January 27-February 3, at the Coliseum and the First Regiment Armory.

Trucks Save Farmers' Time, According to Government Survey.

Ninety per cent of the farmers who responded to a survey made by the U. S. Department of Agriculture state that the factor of time-saving is the greatest advantage of trucks over horse-drawn vehicles. Even on short-hauls the motor truck requires only about half the time needed to make the same trip by wagon.

1,113 Auto Thieves Convicted Under Dyer Anti-Theft Law.

That the Dyer anti-theft automobile law is working effectively is evidenced by the fact that 2,120 stolen automobiles have been recovered, and that 2,773 arrests have been made, out of which 1,113 persons were convicted, with an average sentence of about two years per person.

A Small Capital Plus Grit and Hustle

A Combination That Works Wonders in These Days of Competition—There Are Many Ways to "Ask Folks to Buy" and the Man Who Plays Woodpecker and Uses His Head Gets the Business as the Man in our Story Found

By J. N. Bagley

Scarcely had Henry Hoit completed his large garage building, covering nearly a half block, when his health failed him and the doctors advised his going west for two or three years. His investment ran well into the thousands and it was no little job to find some one to buy the business, for few men with the necessary money cared to embark in the automobile game.

When Hoit found it a hard matter to sell the building, he decided to lease it for \$150 per month. He had a few nibbles from men in the general merchandise business, but they wanted it entirely remodeled to suit their needs and this Hoit refused to do.

Ted Brown heard about the building and came down to rent it. When Hoit learned that Ted had only \$1,300 capital to run a business in a building covering a half block and renting for \$150 per month, he smiled and asked:

"What would you do with that building and \$1,300 or, rather, \$1,150, after you had paid the first month's rent? Besides, there would be the lights, telephone and other overhead items to take care of which would amount to no small sum. I expected to handle a line of cars and tractors and carry a large stock."

"That's all well and good," returned Ted, smiling, "but I expect to pay the rent and make a living with the first month's rent paid and \$1,150 in cash."

"Did you ever know me to fail in anything I have undertaken, Mr. Hoit?" he added, earnestly.

"N—No. I can't say that I have, but you have never bitten off such a mouthful before in your life. It's too big a deal for you, Ted."

"Too big, your grandmother!" answered Ted, a bit excited. "Give me a chance and I'll show you," and he slapped his hat down on the table.

Hoit smiled and eyed Ted closely for a half minute.

"You are just like the rest of the world, Mr. Hoit, you are afraid to give a lad a chance," snapped Ted, and he picked up his hat.

"I'll call that bluff, Ted. I'll give you the chance, darned if I won't, and we'll draw up the lease. For how long, Ted, do you think you can run her on \$1,150?"

"Five years," answered Ted, without hesitation, "and then maybe I'll buy her if she suits me and you still want to sell her."

Eight years have elapsed since Hoit drew up the lease for Ted to sign and Ted now has a deed to the building, one of the finest accessory stocks in the city, and is very nearly out of debt on the entire investment. While Hoit has regained his

Primary Duty of Society.

The primary duty of organized society is to enlarge the lives and increase the standards of living of all the people, not of any special class whatever. The waste of employment during depressions; from speculation and overproduction in booms; from labor turnover; from labor conflicts; from failure of transportation, fuel and power supplies; from excessive seasonal operation; from lack of standardization; from loss in our processes and materials—all combine to represent a huge deduction from the goods and services that we might all enjoy if we could do a better job of it.—Secretary of Commerce Hoover.

health, he prefers to remain in the west. His eldest daughter prefers to come back to the county seat and be a co-worker with Ted. She expects to arrive November 1, unless the railroad strike prevents.

Getting back to Ted and the business, the writer had the pleasure of spending a couple of days with him only recently and it is, to say the least, very interesting to observe the way his business is handled.

The building has a frontage of 80 feet, mostly plate-glass. The bulk of his accessory stock is arranged in this window, as various pedestals, shelves, etc., are built especially for displaying it.

One corner of the building is particularly suitable for a showroom and office. The entire floor above is fitted up for a workshop, and the "Trouble Man" works on the first floor, sending such jobs above as are to be handled there. In Ted's employ is a young man who has charge of the accessory stock, and the way he does things is wonderful.

The morning I drove down the weather was ideal and I admired the stock in the window above all else in the city. I drove out for a couple of hours and when I came back the weather was much changed, a threatening storm hovering near. The peals upon peals of thunder caused the tourists and townsmen to move about quite hastily.

As I drove into the garage, I noticed the window had taken on a new appeal for

the passersby. An elaborate display of tire chains, raincoats, storm curtains, etc., were in the foreground, while all about the windows were large cards suitable for the occasion. Before nightfall the sky was again clear and the thermometer reading was 96 in the shade. Again the window took on a new aspect, and motor meters, water bags, and such hot weather necessities as folks might need, were shown together with a new set of window cards which were appropriate to the display.

I asked Ted how he came to hit upon the idea of window changing and using window cards, and the following is his own story:

"When I started this business I didn't have the money to advertise as other merchants did, so I began to see that I could cash in on the manufacturers' advertising and it has paid me so well I have never quit it."

Ted led the way to a little room, about 10 feet square, off to one side of the office. This room had cupboards and shelves of all kinds loaded with dealer helps, such as samples, window showcards, magazines containing single and double-page spreads of goods stocked. Hundreds of window showcards were carefully filed away. Every day—and many times twice a day—these cards were changed, depending upon the weather. The stock of window cards is kept up-to-the-minute.

Once each month a circular letter is sent out to every car owner in the country, calling attention to some item in which the car owner would be interested. A neat envelope insert, furnished by the manufacturer and bearing the imprint of Ted's garage, is also enclosed.

The mailing list is up-to-the-minute. Ted can refer to this list and he knows what make and model of car each man drives, what size tire he uses and, if he sold them, just how old they are. If he ever repaired the car, he has a complete record of the job, when it was done, etc. Every day some of the customers on the list get personal letters regarding tires which they will soon need or bumpers they should have to protect their cars. One young lady works continually on the mailing list and writing personal letters.

Every overhaul job that leaves the place is followed in one week with a letter asking all about it and whether or not the customer is entirely satisfied. At this time, a suitable insert is enclosed, featuring a tire,

(Now Turn to Page 32.)

How Repairs of Cord Tires Are Made

Increasing Popularity of Cord Tires Makes It Necessary for Repairman to Understand This Phase of Tire Repairwork Thoroughly—How Tire Is Made Ready for the Repair and Steps Required to Properly Complete It

By H. J. White and Lowell R. Butcher

Instructors in Automobile Trade School, Des Moines University.

The increasing popularity of cord tires makes it necessary for the repairman to thoroughly understand this phase of the repairwork. Of necessity, cord tires are higher priced than fabric tires and the motorist is more apt to seek a repair for this type of tire than to replace with a new casing.

Of the two types of cord tires—fabric cords and cable cords—the fabric cord is most apt to be encountered. In repairing this type of tire extreme care must be taken in the inspection, insuring that all loose or separated places of the carcass are found.

The construction of the fabric cord tire is very similar to that of the ordinary fabric tire and, with a few deviations, the same methods of repair may be followed. Approximately three different weights of cords are found in tires of this type—medium cord, medium-heavy cord and heavy cord. Naturally, the heavier the cord fabric the fewer the number of plies used.

Fabric cord tires will vary somewhat in the way the cords are applied in relation to the run of the cords. In some cases the direction changes alternately, and in others two plies with the same run will be found successively. The run of the cords should be noted when the tire is cut down.

Any fabric cord tire not having a badly separated carcass, or which has not seen excessive service, may be repaired. Simple blowouts or deep cuts are easy to repair and the operations of repair will be very much the same as for fabric tire. Probably more care must be used when stepping down the plies and in pulling the cords.

The side section repair is rarely used on fabric cord tires except, perhaps, in the case of a few of the smaller sizes of tires.

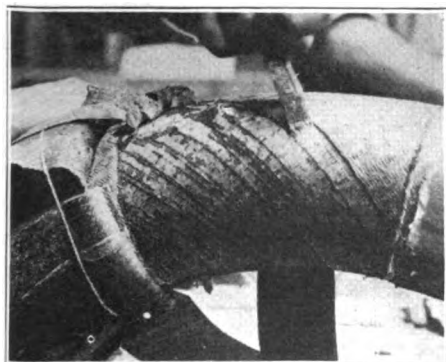


Fig. 1. Showing Tire Cut Down, Buffed and Cemented for Retread.

The three-quarter and the complete sections are the two repairs most often used.

The three-quarter section is used for minor damages of the tread and side-walls or for small fabric breaks. It is not recommended for blowouts or any injury that weakens the carcass to any extent. The majority of fabric cord injuries must be repaired with the complete section, which gives an anchoring place at the bead for one or more plies. The necessity of anchoring the end of the ply may be seen when we remember that fabric cord tires have not the strength of cross-threading and that one cord does not support another.

The fabric cord three-quarter section, Figs. 1 and 2, is made exactly the same as for that of a fabric carcass except that the length of the lay-back may differ, due to the difference in number of plies and a greater step-down. In fabric cord tires,

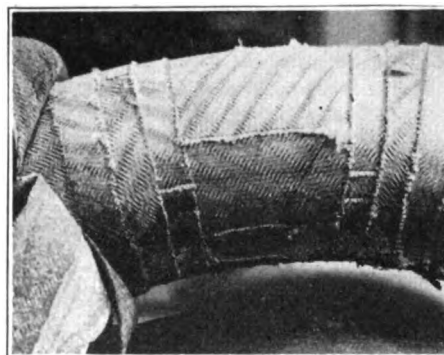


Fig. 2. Cord Tire Cut Down for Three-Quarter Lay-Back.

each step-down is one inch instead of the customary three-quarter inch for ordinary fabric tires. In some of the larger sizes of these tires, even greater step-downs are given. As in the case of fabric tires, two or three plies remain after the tire is cut down.

In building up a fabric cord tire, all new carcass material is placed so that the run of the cords is the same as that of the section removed, Fig. 3. This insures that the cords will pull and flex with those in the corresponding ply.

Buffing should always be in the direction of the run of the cords, Fig. 4. More care in buffing is used, insuring that the old material is cleansed until shiny. In cementing, apply the first coat comparatively thin and very liberally, giving the cement plenty of opportunity to soak in. It is good practice to give the repair at least four coats of cement, Fig. 5. This will be



Fig. 3. New Materials Are Cut and Placed So That Run of Cords Is Exactly Same as of Section Replaced.

regulated by the condition of the carcass, some cords absorbing much more cement than others.

Reinforcing boots should be made of fabric cord material, preferably of the same weight of cord as in the tire being repaired. Boots for fabric cord tires are stepped exactly as for fabric boots.

Perhaps the operations of fabric cord repair will be better understood if a complete section repair is followed through, step by step. A very common size of fabric cord tire is the four-inch, and a repair on this size will be used as an example.

After locating the injury the splice end is marked by measuring five inches along the crown of the tread. Cut the tread across the tire from tread line to tread line, beveling at a 45-degree angle. Lay back the tread until it clears the injury five inches beyond the damaged spot. Loosen and turn back the bead cover on both sides of the tire. Step the side-walls $\frac{1}{2}$ -inch towards the injury, and lay back a like distance beyond the injury. Frequently it is necessary to remove the old gum in strips, Fig. 6.

Using a steel scale, mark the tire for the first blackout. This will be two inches shorter than the distance from the splice end to the lay-back end of the tread—that is, the first blackout is stepped one inch at either end. This ply is taken off from toe to toe of the beads. Step the second ply one inch in at either end and remove the same as the first. The third ply off is stepped and removed exactly the same as the first two.

Assuming this size of tire to have six plies, four are removed, the fourth being stepped the usual one inch and ended at the heel of the bead if possible. If the

bead construction does not allow this ply to be taken from the bead, it is ended on the side-wall about 1½ inches up from the bead channel on either side of the tire.

Skive the injury and buff the tire, using the precautions mentioned in handling cords

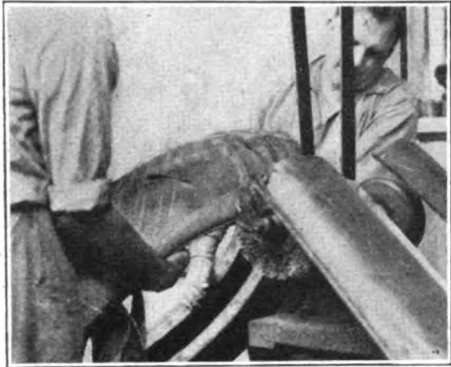


Fig. 4. Buffing Should Be Done With Due Regard for Run of Cords.

when buffing. Washing with gasolene is done carefully, removing all dirt and grease.

After all gasolene has evaporated, the tire is cemented inside and out. Prepare the inner boot, using the carcass of a tire which has similar sized cords. Ordinary fabric boots may be used but they are not as pliable, and it is best to use a cord boot if possible.

The injury of the tire is filled with cushion stock before covering the exposed carcass with a layer of the same material. The first ply on laps the edges of the last blackout 1/16-inch on all edges, except when the last ply off was removed to the heel of the bead. In this case, the bead edges of the new material will fit the section blocked out. As mentioned before, the run of the cords should be exactly the same as in the section being replaced.

The next two plies on lap the usual 1/16-inch at the ends, and extend to the toe of the bead on either side. The last ply on laps the ends and extends around the toe of the bead, it being cut long enough for the two ends to meet on the inside of the

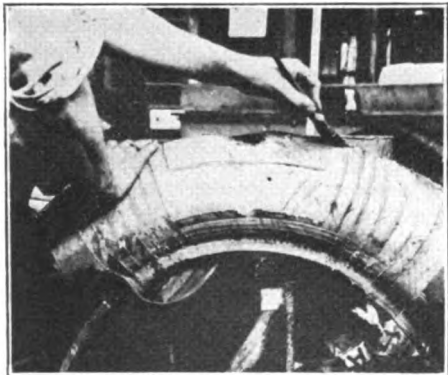


Fig. 5. Tires of Cord Carcass Require More Cement Than Those of Fabric Carcass.

tire. The material for this ply should be cut so that the meeting point comes at one side of the injury. Washing, rolling and perforating is done as each ply is added.

The bead cover is now replaced if in

good condition. If badly damaged, a new one should be made and applied. Bead covers are rarely omitted in repairing cord tires as the cords are more susceptible to injury and need the binding action of the bead cover.

If the repair materials used were friction coated on both sides, it is not necessary to apply a layer of cushion before replacing the tread and sidewalls. If cushion is used, it must be rolled down well and perforated before turning back the tread sidewalls.

From now on the repair is completed exactly as in the case of a fabric repair. Cure is accomplished in the sectional mold, using the curing tables as a guide for time and pressure.

Since so many large trucks have come into common use, the repair of the heavy-duty cord tire may form a lucrative portion of the shop's business. Tires of this type may be successfully repaired but the operations are much more difficult and the greatest skill must be used if the repair is to give good service. Until the repairman is capable of doing expert work, repair on the heavy-duty cord tire should be made with a tread patch and a heavy inside boot. This will give mileage but is not as dependable as the complete section repair.

Owing to the fact that the build-up material used in a complete section repair on a tire of this size is very thick, the triple cure is usually used. After the new cord has been built up, the repair is semi-cured, using the sectional mold and air bag. When the building-up is completed, the cure is completed in two hitches, taking half of the repair in each hitch. Some repairmen use the sectional mold for the first cure and finish the job on the inside arm.

Taking for example the 7-inch heavy-duty cord, Fig. 7—a tire that is commonly used on heavy trucks—the operations of a complete section will be outlined.

The length of the mold is measured before starting to cut down the tire. Usually this will be 30 inches on a quarter-circle, 7-inch mold. Remove the tread entirely for a distance two or three inches longer than the mold, keeping the injury at the center of the exposed tread section.

A tire of this size and type usually has 10 plies; six of these are removed from the outside and one from the inside when cutting down. The first ply off is measured seven inches from the injury each way, and removed to the toe of the bead on either side of the tire. The next five plies are each stepped one inch at either end from the preceding blackout.

The first four plies are removed as far down as the bead construction allows and the last two are ended on the sidewall. The sidewalls are removed two inches from the largest blackout at each end. The bead covers are removed, stepping slightly from the ends of the sidewalls.

Skive the injury and jack open the tire, removing the inner ply in a section that

is slightly larger than the largest blackout on the outside. Both inside and outside of the tire are thoroughly buffed and cleansed, scraping parts that cannot be reached with a buffing wheel.

Prepare a boot for the inside reinforce-

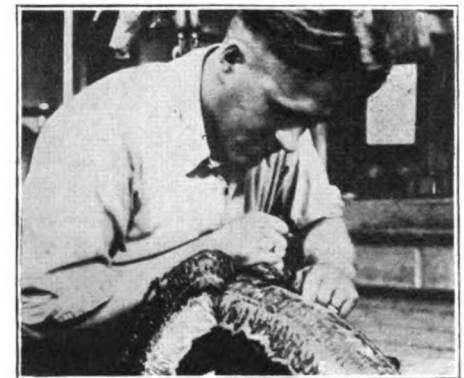


Fig. 6. It is Frequently Necessary to Remove Old Gum in Strips.

ment. A five-ply boot will be about right for this size of tire. Cement the tire inside and out in the usual manner and start the building up. Fill the injury with cushion stock and cover the exposed section with a thin layer of the same material. Replace each blackout with new cord fabric lapping 1/16-inch at the ends. The last ply on extends over the beads, and meets on the inside of the tire as in the repair of the smaller sizes.

A layer of cushion stock should be applied to the inside of the tire before this ply is rolled into place. Bead covers are replaced, and sidewalls built up from two thicknesses of new gum. A ply of new cord is now added to the inside of the tire, to replace the section blocked out. This will lap the usual 1/16-inch at the ends. A thin layer of cushion stock is placed over this and the inside boot applied.

The tire is now semi-cured in the sec-

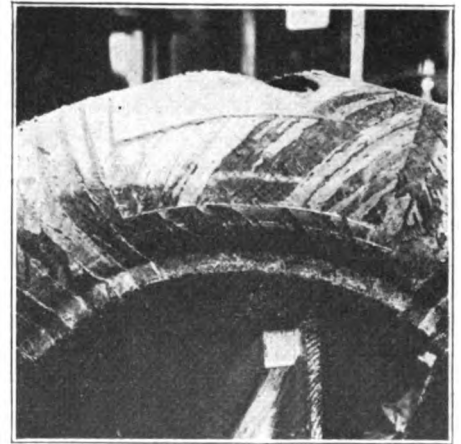


Fig. 7. Seven-inch, Heavy Duty Cord Ready for Buffing.

tional mold, using the customary air bag. After this semi-cure, the outside of the tire is buffed, washed and three coats of cement applied. The tread section is re-
(Now Turn to Page 31.)

Shooting Trouble in Electric Circuits

Some Men Seem to Be Born With the Ability to Shoot Electrical Troubles While Others Are Not So Lucky—If the Others Go About It in the Right Way They Can Usually Make Themselves Equal to the Best in Their Line

By H. P. Manly

It seems to be a trait of human nature to want to avoid the preliminaries of any undertaking, and that is the underlying reason for the failure of so many service men to become speedy and accurate in locating electrical trouble. To the man who has a certain small number of principles clearly in mind there are no mysteries in this part of his work and every problem yields to his method of treatment. Without these fundamentals every case is a gamble.

The first big thing is to be able to follow an electrical circuit from start to finish, from the positive side of the source, whether it be battery or generator, all the way around and back to the negative side, and finally from negative to positive through the source itself. There are several different circuits on the average car but the trouble-shooter is usually concerned with only one at a time.

The starting circuit is generally the simplest; it includes the battery, the starting switch and the starting motor with their wiring and ground connections. The charging circuit includes the generator armature and brushes, the cut-out, the regulator if one is used, the battery and their connections. The field circuit includes the field windings, the generator brushes and the regulating devices or parts of them.

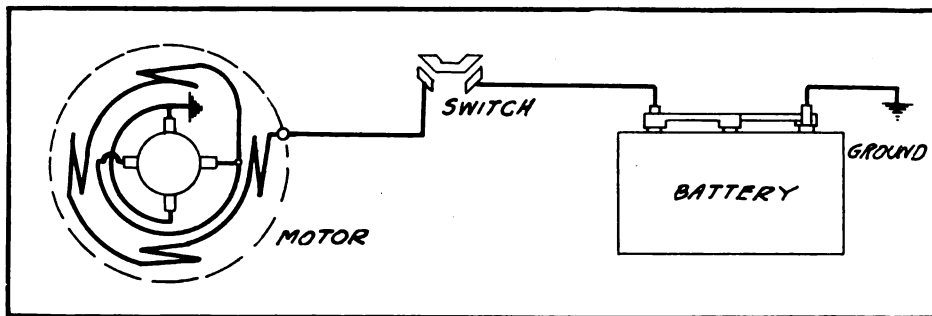
There are two ignition circuits—primary and secondary. In battery types of ignition the primary includes the battery, the switch, the primary winding of the coil, the resistance element, the breaker or interrupter and the condenser. The secondary ignition circuit includes the high tension winding of the coil, the distributor and the spark-plugs. The variations in design of these various circuits on different cars add the element of mystery to trouble-hunting if not systematically handled.

Typical circuits of the various kinds are shown in the illustrations. All of those shown use a ground return, although many starting circuits are carried completely through copper cables. In every case it

is possible to start from the source and trace the circuit through the wiring connections, through each unit, and back through ground to the source.

Every man will say that this is altogether too elementary an idea with which to waste

When the current escapes into the wrong path it is called a "short" or a "ground." A short circuit allows current from the source to come back to the source without having passed through the units of the circuit. An accidental ground is a form



The Parts of a Starting Circuit.

his time. Yet the greatest single cause of losing time in hunting trouble is failure to trace a circuit *all the way* through and back again, especially the "back again" part which usually includes the ground connections.

Now we can lay down the first rule of trouble-shooting. Decide what circuit is in trouble—starting, charging, lighting or ignition. Learn where that circuit starts, where it goes, and how it gets back. Then prepare to follow it all the way in looking for trouble. If necessary, secure a diagram of the car's wiring or get a book of such diagrams to work with.

Kinds of Trouble.

It is evident that if the proper amount of current passes through each unit in a circuit, with none escaping where it should not go, there will be no trouble and all functions will be properly performed. Conversely, there are two general classes of trouble that will prevent proper operation; either the current can travel through the wrong paths or else some part of the circuit is in such condition that not enough current can travel through it.

of short circuit in which the return to the source is through the metal of the car, or ground.

When an insufficient amount of current passes through a circuit, the cause will be found in excessively high resistance at some point or in an open circuit that prevents any current from passing.

If we know the circuit and are able to locate the presence of any shorts, accidental grounds, points of high resistance or open circuits in it—that is all there is to trouble-shooting because there are only four kinds of electrical troubles.

This ends the preliminaries, and it will now be possible to proceed with explanations of practical methods of locating faults. Five things must be remembered:

A circuit means an electrical path all the way around from source to source and not only part of the way.

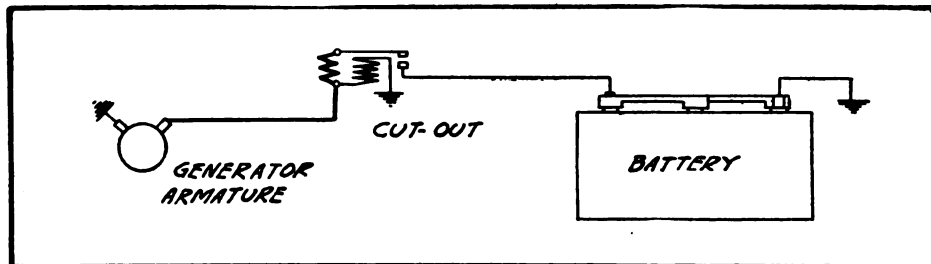
A short allows too much current to leave the source but allows too little in some parts of the circuit.

An accidental ground acts the same as a short.

A point of high resistance allows too little current to flow in all parts of the circuit.

An open allows no current to leave the source nor to flow in any part of the circuit.

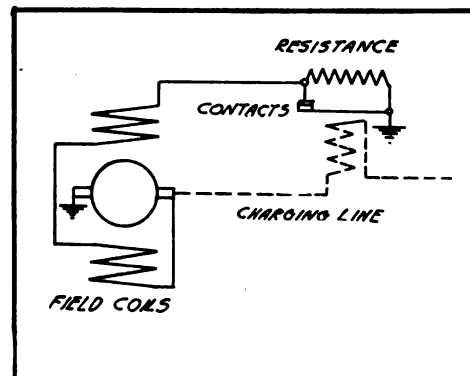
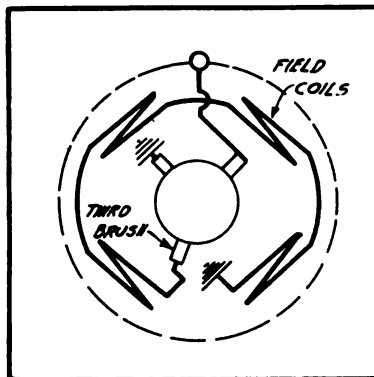
In going after electrical troubles, we will follow a systematic procedure in every case. The hit-or-miss method often seems to work wonders in speed, but it only does so about every tenth time—the time you talk about. The other nine times will yield only to a methodical search, unless you have special knowledge and familiarity with the particular equipment being handled.



A Charging Circuit.

There is always a symptom to start with. It may be dim lamps, a discharged battery, slow cranking, misfiring or any one of a hundred things. It is the evidence that something is wrong and it brings the car into the shop. After the symptom is known, it is necessary to locate the trouble responsible for it, then to find the cause for that trouble, and finally to remedy the trouble and remove the cause.

Troubles in the lighting circuits will be indicated by some or all of the lamps being dim or remaining out while the engine is idle. Troubles in the charging circuit will be indicated by the battery's state of charge and by the action of the lamps while the engine is running. Troubles in the starting circuit will be indicated by slow cranking, by failure to crank or by the condition of the battery. Ignition troubles are indicated by failure to fire the charge or by misfiring. In any case, it will be possible to almost immediately restrict the field of trouble-shooting to the circuit which is indicated by the symptoms, so that we can eliminate



A Third Brush Field Circuit and a Vibrating Regulator Field Circuit.

are found, either the battery is discharged or there is trouble in the battery itself, and it should be replaced with another for testing purposes.

Since the battery forms a part of all the main circuits, trouble in any of them will usually result in discharging the battery and, when such a condition is found, it will be necessary to check the conditions

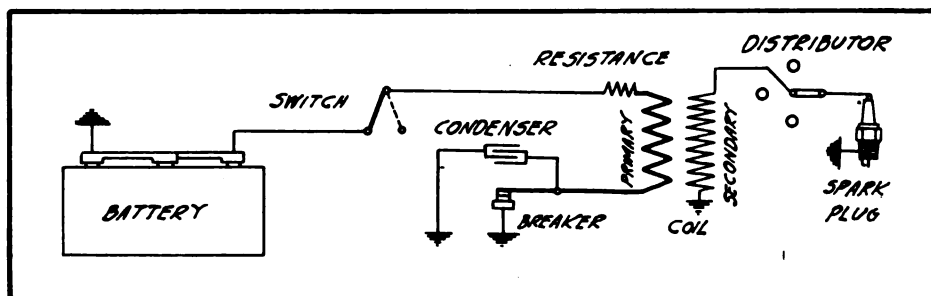
and ignition ends of this work before taking up those of the battery, it is nevertheless necessary that we first determine whether a discharged condition of the battery is due to faults in the other parts of the electrical equipment, or to faults in the battery itself, or in the care which it has been given.

With a low specific gravity, or with a failure to hold up the voltage on a discharge test, it will be in order to examine the battery.

1. Are the cable fasteners loose, dirty or corroded? If so, they must be removed, scraped clean, covered with vaseline, re-assembled and again covered with vaseline. This condition may be due to attaching copper wires directly to the battery, to spilled electrolyte, to loose or broken plugs, to overfilling or to poor sealing around the cell covers.

2. Does the engine start easily? If not, see that there is not undue stiffness when cranking by hand, see that there is good compression, that the choker closes properly, and look for the usual causes of hard starting which makes an unwarranted drain on the battery.

3. Is the battery case badly rotted? If so, see if the battery has been supported on



The Primary Ignition Circuit and the Secondary Circuit.

about three-fourths of the hunt to start with.

The First Step.

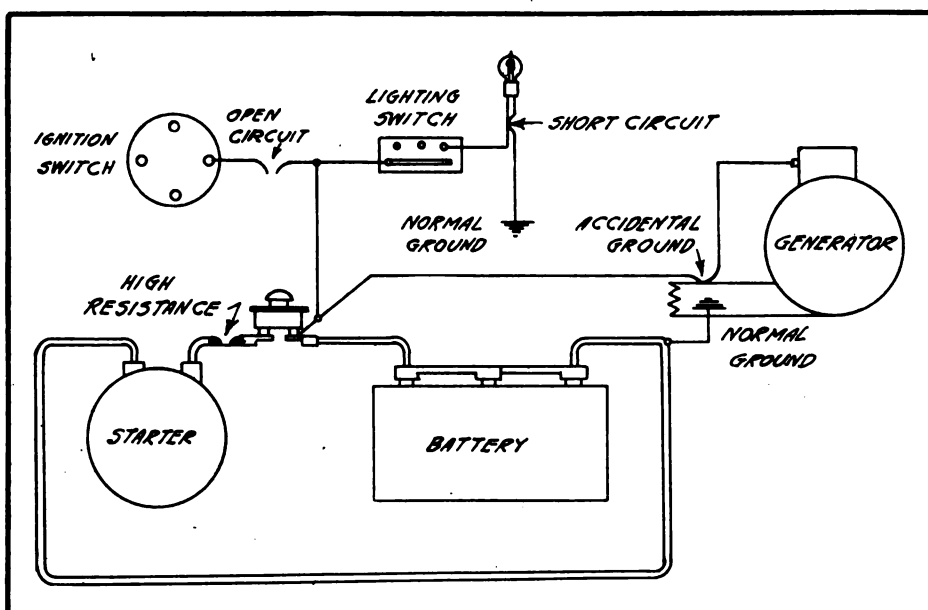
There is one part of the equipment that forms a portion of every important circuit in the electrical system—that part is the battery, and that is where all trouble-shooting should start. There are two different ideas of working; one is to "get by" and get rid of the car with what often amounts to only a temporary repair. The other way is to remedy the apparent trouble but to do the work in such a way that it is permanently removed and also in such a way that contributing troubles are removed at the same time. It is this second and better idea that causes us to start at the battery in every case.

The first test is with the hydrometer unless the shop equipment includes a discharge tester which, in the hand type, is still easier to use than the hydrometer. Specific gravity of 1.150 or below indicates a discharged battery and good work cannot be done until it is charged or until a charged battery is substituted for it.

A gravity of 1.200 is really the low limit of good operation. With a discharge tester allowing a current flow of 75 to 100 amperes per cell, or its equivalent, on a three or six-cell battery, the voltage of each cell should not fall below 1.65 or 1.60 in any case. If one or more weak cells

in the lighting, charging, starting and ignition circuits unless the condition or appearance of the battery itself clearly indicates other causes for the discharge.

While it is the intention to deal with troubles in the starting, charging, lighting



Four Forms of Electrical Trouble—Open Circuit Prevents Ignition; Point of High Resistance Prevents Cranking; Short Circuit Will Put Lamp Out; and Accidental Ground Prevents Battery Charge.

bars or cleats so that there is air space all around it and see that this air space has not become filled up. A rotted case may also result from any of the causes given for corroded fasteners except the attachment of copper wires.

4. Is the battery top dirty or wet? If so, wash it with clear water and dry thoroughly.

5. Is the battery loose in its carrier rather than being securely clamped? This may be the cause of broken jars or broken posts or plate straps.

6. Is the level of the electrolyte below the plate tops? If so, fill with distilled water and charge. This condition would naturally have been noted when making the hydrometer test.

7. Are the large cables drawn so tightly that the posts have been broken or loosened? This condition would call for repairs to the posts and sealing, and for loosening the cables.

If any of the foregoing troubles have been found, they should be remedied and the battery replaced. If the original symptom of trouble now disappears, the fault has doubtless been found and remedied and no trouble need be looked for in the balance of the system.

Even though external appearances do not indicate battery trouble, it may still be present and a fair idea may be secured by questioning the owner or driver as to care and operating conditions:

1. Is a great deal of night driving done or are a great many stops and starts made? Either condition causes too great discharge for the amount of charge and calls for a readjustment of the charging rate.

2. Is the battery more than a year and a half old? If so, it may be worn out and should be replaced if capacity tests show it to be beyond repair.

3. Has the car remained idle for a long time with the battery partly discharged? This will cause the plates to become badly over-sulphated and will call for a long, slow charge to correct the condition.

4. Has any one cell taken much more water than the others? This would indicate a broken jar or poor sealing.

5. Have the cells been filled with water to a height greater than one-half inch above the plate tops? Overfilling will cause corrosion of the terminals and will allow slight shorts across the wet top of the battery.

6. Is the electrolyte taken from one cell always replaced in the same cell when making hydrometer tests? Replacing all or part of it in another cell will unbalance the proportion of acid in the cells.

7. Has the battery been subjected to freezing temperatures while discharged? If the electrolyte has been frozen, the battery is probably ruined.

8. Has the battery been dropped or handled roughly? This treatment will probably have cracked one or more jars and allowed the acid to leak away.

9. Has acid or anything except distilled

ELECTRICAL TROUBLE-SHOOTING PRINCIPLES.

Symptom—Discharged Battery.

1. Take hydrometer reading. If 1.150 or below, the following tests should be made:

2. Make a discharge test which should show voltage not below 1.65 or 1.60 on any cell with discharge of 75 to 100 amperes per cell. If below this limit, make the following tests:

3. Examine the battery—

Cable fasteners loose, dirty or corroded?

Does engine start hard with hand cranking?

Is the battery case badly rotted?

Is the battery top dirty or wet?

Is the battery loose in its carrier?

Is the electrolyte level below the plate tops?

Are the large cables drawn too tightly?

4. Question the car's operator—

Is there much night driving or are there a great many starts and stops?

Is the battery more than a year and a half old?

Has the car remained idle with the battery discharged?

Does any cell take more water than the others?

Have any cells been overfilled?

Has electrolyte from one cell been replaced in another?

Has the battery been frozen?

Has the battery been dropped or roughly handled?

Has anything except distilled water been added to the cells?

5. Charge battery or replace with another to make the following tests:

6. Insert ammeter at battery. Any reading with all switches turned off indicates a short circuit or ground between battery and switches.

7. Turn on lighting, ignition and accessory switches one at a time. Ammeter readings above normal amounts given indicate shorts or grounds in the circuit whose switch is turned on.

8. With all lamps turned on, start and run the engine. If there is no charge or discharge, it indicates trouble in the charging circuit.

9. Reconnect the battery cable, turn on the lamps and press the starter switch. Lamps dim or out indicate shorts or grounds in the starting circuit or mechanical trouble in the starter parts or the engine.

water been added to any cells? This practice will either ruin the plates with excess acid or will introduce various impurities with tap water, anti-freeze solutions, etc.

If the battery has successfully withstood

this examination, and if the course of inquiry from owner or driver shows no wrong conditions, a discharged battery indicates trouble in other parts of the system. The battery should then be charged or replaced and the electrical equipment checked up.

Checking Overloads and Charge Rate.

We have now arrived at the point where a discharged battery forms the symptom of trouble and we will assume that no other knowledge is at hand as to the reasons. We have eliminated causes that are peculiar to the battery itself, its care and the conditions of operation, and know that we must look to the remaining parts of the equipment.

1. Shorts or grounds.—See that all lighting, ignition and accessory switches are turned off and that the starter switch is open. Disconnect one of the large cables at the battery or as near it as possible and insert an ammeter, having a range of between 20 and 30, between the end of the cable removed and the battery post or connector from which removed.

If there is any reading on the meter it indicates a short circuit or accidental ground between the cable end attached to the meter and the starting, lighting, ignition or accessory switches, or between this cable end and the generator cut-out, but not beyond these points at which the various circuits are opened by their switches or the cut-out.

2. One at a time, turn on each lighting switch, the spot-lamp switch, the ignition switch and the switches for any other accessories. As each switch is turned on, watch the ammeter. With all lamps turned on, a 6-volt system should not show over ten amperes discharge. Battery ignition, when first turned on, should not show over five or six amperes discharge. The horn alone should not draw over 15 amperes when running.

Do not forget to press the brake pedal if a stop lamp is used. In other words, be sure to turn on every switch for each circuit. If, with any one switch turned on, the ammeter shows a discharge above normal, it indicates a short-circuit or ground in the circuit controlled by that switch and between the switch and the units in the circuit, but not between the switch and battery.

3. Turn on all the lamps it is possible to use at one time and, with them turned on, start the engine and run it at a speed equivalent to 20 miles an hour. The ammeter should show at least three or four amperes' charge under these conditions. If there is no charge or if there is a discharge, it indicates that the generator charging rate is too low and trouble is indicated in the generator, cut-out or regulatory device.

4. Remove the ammeter and replace the cable securely. Turn on all the lamps. Press the starter switch and watch the brilliancy of the lamps. If they become very dim, or if they go out entirely, it indicates a short-circuit or ground in the start-

(Now turn to page 32.)

Welding, Cutting and Brazing Practice

Beginner Must Understand Reasons for Preheating So that He Can Apply It Intelligently and Avoid Waste of Time and Material—Methods and Devices Used for Preheating Various Jobs Are Described and Illustrated

By David Baxter

After the job has been prepared for welding, the next thing is usually the preheating—provided, of course, that it is not of a class that does not need to be heated previous to applying the welding flame. As this class is so comparatively simple, we will not take it up until farther on in the discussion. It is a class including, principally, steels and wrought-iron forgings insofar as automobile welding is concerned.

The major portion of the automobile welder's work will consist of castings of various metals, and this is the class that requires preheating in varying degrees.

In a previous chapter, we have already discussed several types of preheating apparatus, together with the fuel employed for the operation of each. But it may be well to go a little deeper into the subject of preheating before taking up the actual welding operation, in order that the beginner may obtain a clearer understanding of what he may expect when he attempts to heat the casting before he applies the flame.

As stated before, the principal reasons for preheating are to facilitate the fusion and to control the stresses of expansion and contraction, the latter being the most essential factor in any preheating method because work which needs preheating solely to assist in the melting may usually be welded without heating previous to the fusion heat.

Therefore, to simplify instruction in preheating practices, we will concern ourselves chiefly with the class of castings which require heating before and during the welding process, to prevent an unequal stress of expansion and contraction from warping or cracking the job.

Generally speaking, all automobile castings require preheating, on account of the irregular shapes and the varying metal thicknesses in adjoining sections. That is, few automobile castings are of such design that they do not need to be heated previous

to the application of the weld in order to prevent damage through unequal contraction. And, to this end, the beginner should endeavor to understand the reasons for the preheating in order that he may apply it intelligently and thus eliminate the wasting of time and material.

In many cases, the heat may be localized or confined to one part of the job, thus saving the time and trouble it takes to heat the whole casting—not to mention the fuel it saves.

In other jobs, the welder may localize the preheating in such a way as to take advantage of its expansion reaction. For instance, by heating one spot or part of a job, he may cause the part which is to be welded to spread or open up enough to take care of the resultant contraction when the weld cools. The effect is the same as heating the whole thing.

In any event, the preheating should not be overdone. The casting should not be heated

Rapid fire should not be employed in preheating aluminum unless the operator is an expert. Even then it is risky business, especially if the job is to be of long duration. A slower, well-directed heat is better for

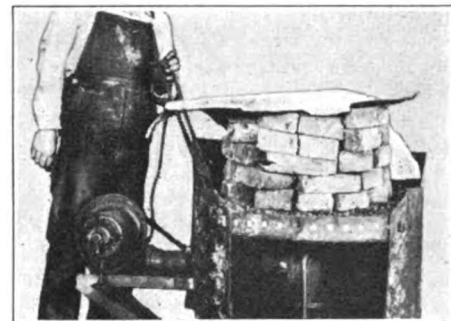


Fig. 3. Using Home-Made Forge Device to Preheat Small Castings.



Fig. 2. Preheating Crankcase With One Oil Burner Near Center.

to a very bright red if the heat is to be maintained for any considerable length of time, particularly if it is of cast iron, because this stage of heat tends to destroy the true metallic life of the iron, rendering the heated part weak and brittle. On the other hand, a dull red heat may be maintained indefinitely, almost, without appreciably damaging the iron.

The overheated casting enters a state of what might be termed internal oxidization, the oxidizing soaking all of the way through the metal and turning it to an almost non-metallic, worthless substance, insofar as strength is concerned.

Take, for instance, such castings as crankcases and cylinder blocks. Here are two jobs which are easily overheated—particularly, aluminum castings. In the latter case, overheating often means a total collapse of the casting, since this peculiar metal is extremely weak and crumbly when it reaches a certain state of heat.

aluminum welding, because it affords opportunity to complete the weld between the time of sufficient expansion and that of the danger point.

Cast iron will not collapse like aluminum, but it will sometimes sag if it is not properly supported. This sort of distortion is difficult to remedy, especially if unnoticed until the job cools. Overheating increases this tendency to sag or warp. Probably more danger is due to overheating than to not preheating enough. In fact, many welders now weld cast-iron jobs at what is termed a "black heat," which they formerly thought impossible without heating to a bright red. The metal is heated so that no redness shows in daylight.

The success of a weld depends upon the preheating, but not on that alone in all cases, because the execution of the welding may be awkward and ill-timed and thus destroy the effects of the preheating. An expert operator will heat only a part of a casting which he used to heat all over as a beginner. That is, a proficient, experienced welder will save lots of time and labor by localizing or, in other words, controlling the preheating. Until he learns, the novice must be content with the slower method of preheating the whole casting.

Lack of space in the article dealing with preheaters prevented us from going into details concerning methods and practices in this important phase of the welder's art. So, from the student's standpoint, it is no doubt well to cover the subject more fully.

To do this, let us endeavor to see just how certain jobs were heated. Different methods and equipment could have been employed with the same results. Take, for

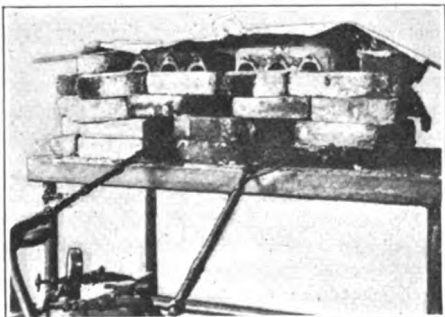


Fig. 1. Preheating Two Cylinder Castings at One Time, Using Two Oil Burners.

instance, the pair of cylinder blocks illustrated in Fig. 1. Here is quite a simple and also quite a common job in the automobile repairshop.

In this case, the preheating was accomplished with an air-pressure kerosene torch or rather by a pair of them. Both blocks were heated at the same time—which is probably more important than the fact they were heated with oil flames. The welding was timed so that one followed the other to prevent loss of time in turning the castings.

In this double job the cylinders were placed on end to heat, and were turned over when ready to apply the welding flame. And the preheating arrangement was such that the kerosene flame spread out beneath both castings, to come up on all sides at once. This mitigated the chance of expansion stresses.

The preheating oven was formed of fire brick, loosely laid with an asbestos covering over it. The castings were heated dull red, showing under the covering. The oil flames were allowed to burn during the heating process and also several minutes after the castings were covered for slow cooling. After the jobs were covered, a close watch was kept during the preheating to ascertain the proper time to start welding operations. The operator peeped under the asbestos covering from time to time.

The crankcase of the block illustrated in Fig. 2 was preheated in practically the

This heated enough of the casting to expand it in the section containing the fracture, thus permitting the fully expanded filler metal to be applied without causing strains. The casting contraction could fol-



Fig. 5. Method of Using Asbestos to Confine Preheating Fire.

low the weld contracting as the job cooled and contracted inward. Thus contraction strains were eliminated.

Had the fracture been located in the water jacket of one or more of the cylinder castings it would have been necessary to heat the job all over on account of the complexities in design offering so much resistance to the contraction of the weld metal.

In either event a dull red heat was the safest for the average welder. This illustration also shows the method employed for confining the heat with fire brick and asbestos paper.

In the article concerning preheater equipment, a sort of home-made forge was described for use in shops that do not have access to fuel gas. In Fig. 3, this device is shown in operation. The welder will find it very convenient for preheating the smaller varieties of automobile castings—such as cylinder heads, blocks, crankcases, housings, etc. The main objection is that it is so easy to overheat or burn one side of the job.

To prevent this, the operator should be careful to keep the casting several inches above the fire and never directly in it. The damper in the air pipe will enable him to control the fire with considerable accuracy. A wall of brick around the job confines the heat and shortens the preheating time.

A variation of this idea is illustrated in Fig. 4, wherein the welder is employing a common blacksmith's forge as a preheater. Where the torch operator has access to a forge, he will find it convenient for many small jobs. Here again he must be careful or he will melt the lower side out of the casting before the job is sufficiently hot for welding.

Sometimes it is necessary to turn the job several times during the preheating process. The fire brick or other enclosure helps to keep the heat evenly distributed and lessens the danger of burning the job. If the forge is power-driven, the fire may be controlled quite readily. It is poor practice to build the fire up around the casting unless this

is done with wood, which may be easily pulled aside. A good bed of charcoal is preferable to a smithing coal fire.

In Fig. 5 is shown the method of confining the preheating to a large cylinder-block casting. Note how the asbestos sheet is draped over a bar of iron extending from end to end of the brick enclosure. Pieces of brick are used to anchor down the ends of the asbestos paper.

In welding, the operator merely punctures the asbestos paper with his torch and welds through the opening, after which he places another piece of the paper over the hole. This eliminates the necessity of moving hot metal covers, such as are sometimes used. The device is arranged on top of the welding table for convenience in welding, with natural gas as a fuel in the preheating.

Fig. 6 indicates the way some heavy castings are preheated where there are no devices at hand for this special purpose. The job in this particular case was welded out-of-doors on account of its size and the great amount of heat necessary to bring it to the proper welding temperature.

The job was raised above the ground enough to permit a wood and coke fire to be kindled beneath and around it. Then, when this fire was burning well, the pieces of sheet iron were placed around it to confine the heat and to protect the torch operator from it as much as possible. A crude chimney served to give the preheating fire sufficient draft to keep the fire burn-

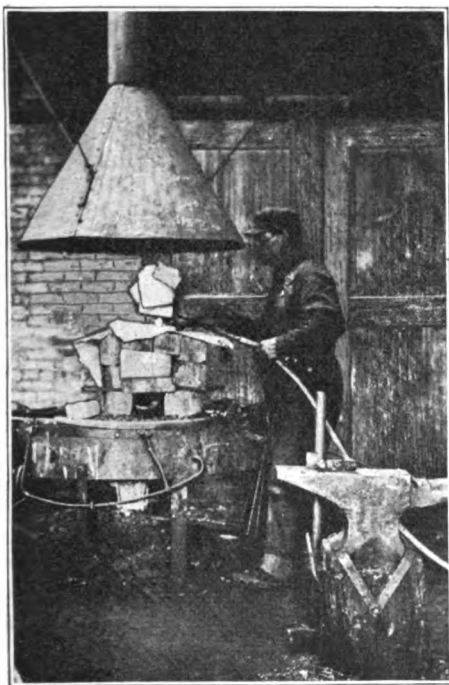


Fig. 4. Blacksmith Forge Is Handy for Heating Automobile Castings.

same way, except that but one oil burner was employed because there was but one fracture to be welded. This burner was arranged so that its flame would envelop about a third of the job in the center where the break was located.



Fig. 6. Crude But Effective Device for Preheating Heavy Job Outdoors.

ing briskly. When the welding was finished, this chimney was removed and replaced with a piece of sheet iron to prevent the draft from cooling the job too rapidly.

The foregoing examples of methods and
(Now Turn to Page 32.)

Care of Commutator and Brushes

Care of Commutator and Brushes of a Starting Motor or Generator Is of Great Importance—Neglect Means Burnt Out Fields or Armature Windings and Expensive Repairs—A Table of "Troubles" and Suggested Remedies

By J. R. Bayston, M. S. A. E.,
Manager, Cooke Auto School

The proper care of the commutator and brushes of a starting motor or generator is very important. If their condition is neglected, expensive repairs will be necessary as it will generally cause the fields or the armature windings to be burnt out.

Brushes must be properly selected, as a brush must have sufficient capacity to handle the amount of current that the instrument is using without overheating. It must also have a certain hardness. If the brush is too hard excessive wear will re-

sult on the commutator, and if it is too soft the brush will wear down rapidly. The brush dust lodging between the segments of the commutator quite often short circuits them.

The spring pressure on the brushes should be uniform, and adjusted so that there will be no sparking between the brush and the commutator. The brush, of course, must have a perfect seat on the commutator, as it is impossible to eliminate sparking by increasing spring tension if the seat is not perfect.

Before the brush tension is adjusted it is necessary to see that the brushes are perfectly free in the brush holder. Oil, carbon and copper particles from the brushes and the commutator will sometimes clog up the brush holder to such an extent that the brush cannot make proper contact.

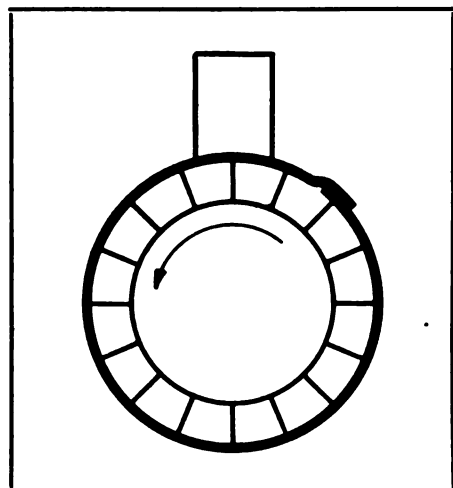


Fig. 1. Showing Better Method for Fitting Set of Brushes.

Too much cannot be said about the proper fitting of brushes. There is a great deal of haphazard indifference shown in this seemingly simple act of making the brush contact conform to the commutator surface. This can easily be proven by examin-

ing the brushes that have been fitted. As a rule, nine out of ten will show incomplete contact when brushes are being fitted to the commutator by means of sandpaper strips being drawn between the brush and the commutator with the sandy side towards the brush.

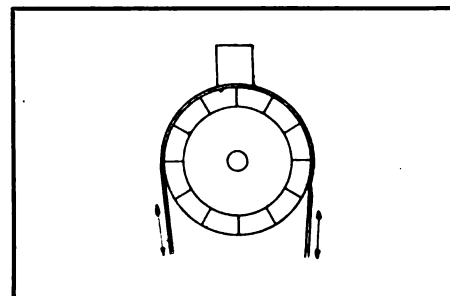


Fig. 2. Strip of Sandpaper Placed Under Brush and Pulled at Each End.

at each end as shown in Fig. 2, as there is seldom sufficient room to get at the strip of sandpaper and pull it backward and forward.

Remove all traces of glue before the
(Now Turn to Page 31)

Causes and Remedies for Sparking of Brushes:

1. Brushes not on neutral position. Shift the brush ring.
2. Brushes covering too many bars. Brush should be trimmed down.
3. Brushes tight in brush holders. Clean commutators with gasoline and if still tight, sandpaper them down.
4. Spring tension too weak. Tighten spring.
5. High mica. Undercut the mica or use an abrasive stone on the commutator.
6. Overload. Undercut the mica and test commutator segments for shorts and opens.
7. Open circuit in armature coil. Rewind that coil in armature.
8. Connection loose on commutator. Scrap and resolder all defective connections.
9. Worn bearings. Refit or replace them.
10. Unequal air gaps between armature and field poles. Grind off long poles or shim up the short ones.
11. Eccentric commutator. True up the commutator by turning or grinding.

Causes and Remedies of Flat Spots on the Commutator:

1. Any form of sparking. See "Causes and Remedies for Sparking of Brushes."
2. High commutator bar. Tighten the bar, holding ring at the end of the commutator; then turn and grind commutator.
3. Low bar. Turn or grind commutator.
4. Eccentric commutator, causing brush to jump from the commutator at high spots. Turn or grind commutator.
5. Difference in hardness of commutator bars. Undercut the mica.
6. Difference in hardness of mica. Undercut the mica.

Causes and Remedies of Blackening of Commutator:

1. Sparking. See "Causes and Remedies for Sparking of Brushes."
2. Oil or grease on commutator. Clean with gasoline.

Glimpses in the Garageman's World

Tea Room Conducted by Eastern Garageman in Connection with Garage Meets with Great Success—New York Garage Opening Advertisement of Business—Pennsylvania Garageman Departmentizes with Pleasing Results

For some time Earl Sloan has conducted a very efficient and first-class garage just outside of West Grove, Pa., which is on Route 131, a through route between New York and Washington, D. C. Frequently, motorists who had stopped for repairs, oil, gasoline and other automotive needs asked for a good place to eat and, there being no restaurant within a mile or more, they often went hungry rather than go back or forward.

Sloan, being of a practical turn of mind, got together with a friend of his and reasoned the thing out. They figured that to erect a small tea room alongside the garage and to cater to the very best trade would pay them—and they thought wisely and well. It was built this past year and has paid even better than they had figured that it would.

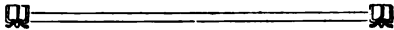
The tea house was erected by local contractors and contains a restroom, an up-to-date kitchen, well-equipped toilet facilities, and a large open fireplace. It is cheery and nice in every way for the most exacting people to frequent. The tables and woodwork are of light color, and chicken waffle dinners and all the best of country cooking can be had here on very short notice. Dougherty, Sloan's friend, conducts the tea house while Sloan operates the garage, and each can help the other, as it often happens that the traveling motor tourists want something to fill the "inner man" and Sloan can tell them "to a T" just what they can have for their meal.

Dougherty can also give the motorist advice about his car, about routes, and other information which will help him—which is a rare service when you figure the two outfits together. This tea house, called the "Roseboro," is a unique combination, and it has been proven that the two work well together. The tea house is of modern construction throughout and of simple design, made to suit the purpose for which it was built. Tourists remark on the idea and pass the word along.

The advertising used is featured in the papers and reaches many people who traverse the route, as many Philadelphia people stop here every Sunday for a meal.

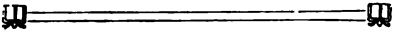
The tea room has also become one of the popular places for West Grove people to eat on Sunday, and so not have to think of cooking their own meals.

When a tourist is eating his meal here,



ROSEBORO TEA ROOM
WEST GROVE, PA.
20 Miles Out of Wilmington on Baltimore Pike
CHICKEN AND WAFFLE DINNERS DAILY
INCLUDING SUNDAY
LUNCHES—SANDWICHES—ICE CREAM

Courtesy
Service



Um—Um! Wouldn't a "Chicken Waffle" Supper Taste Good After a Long Drive?

he gets into a frame of mind which makes him think, with a garage nearby, that perhaps there is something which his car needs that Sloan can supply—and he proceeds afterwards to enter the garage and buy that necessary article, gasoline or oil, or perhaps to have some adjustment made while the meal which he has ordered is being prepared.

Then again, when he stops after a long run, perhaps from New York or Washington, and glances up to see that "Chicken Waffle Supper," or some other meal, advertised on the front porch, his brain automatically registers hunger. Off he goes for the good things that are being served in the tea house.

This idea will pay many garagemen who are considering the same plan, perhaps on a little different scale, in other parts of the country. Sloan's Roseboro garage has more than a mere local prestige. Its fame is known far and wide because of the excel-

lent service and courteous treatment of customers given. Genuine Ford parts are handled and the best trade is catered to and no matter what the job Sloan's garage is equipped to handle it.

The new era of things along the public highways, such as Route 131 has become, opens up great possibilities for the garageman, and this garage has hit upon this plan which combines two business ideas in one, each interlacing and helping the other in a gratifying manner.

Making an Opening Pay.

Plenty of men have opened, or bought or enlarged garages, without any thought of the opportunity offered for making the opening an advertisement for the business. Not so Russell Archibald of Delhi, N. Y.

Archibald had operated a garage for years, but he found the limited space available too small for a growing business, and built a large annex. The annex was built over the ground formerly occupied by his rather inadequate workshop, and this necessitated discontinuing work and shop service during the period of construction which lasted about three months.

It was important that the public at large be informed when his new shop was opened. Ordinary advertising methods would tell the public that he had re-opened his shop. But why stop with ordinary advertising methods when there was a chance to make a great hit, attract everyone's attention and set people to talking about the fact that Archibald's garage was re-opened for service?

Business men comprise three classes—those who see opportunities and do not use them, those who see opportunities and do use them, and those who do not even see the opportunities. This was an instance where the opportunity was seen and used to advantage.

Archibald consulted with the management of the local hospital, which was closing its year with a little deficit of about \$300. He told them he was going to have a big free dance in his new garage annex to open it. He was going to have a good orchestra and extend a general invitation to all the public in his section of the country to come and enjoy



Sloan's Roseboro Garage and Tea Room—A Combination of Two Good Business Ideas.

themselves. There would be no admission fee, and there would be music for the people to dance until daylight if they wanted to stay.

Further, he was going to supply free refreshments—coffee, doughnuts and sandwiches. To the hospital people he said:

"I think people would be willing and glad to pay for their refreshments, but I do not want to make any money out of this deal. If you will help sell the refreshments and provide a cashier, we will charge a fee for all that is used—and all the money will go to your hospital fund. Further than that, if you want to increase your receipts, I will provide a table and facilities and you can have a lot of home-made candy contributed and sell that there at the same time and make that much more money."

Naturally the hospital board accepted the offer, and obviously they advertised the proposition themselves. Archibald advertised the fact, also that receipts for refreshments would go to the hospital fund.

But there was still another opportunity to be made use of, and that was also seized. The Archibald Co. arranged to show a few models of the cars it handles. It went to its competitors and offered each the privilege of showing one or more cars at the same time, without any expense to them.

This made a little automobile show out of the event and helped to attract people, and also had its influence in making relations with competitors more friendly. Some of the competitors took advantage of the offer and some did not, but it was a good move to make the offer and it was good business to accept it.

In order to make the place attractive, all cars except the display cars were removed, the place cleaned and decorated and the concrete floor well powdered with cornmeal to make it slippery enough for dancing. A string of high candlepower lights was run through the place to make it bright, and a supply of chairs and benches was brought in to provide seating capacity.

The event was a success beyond expectations, the attendance being estimated at from 800 to 1,000 and the money taken in being sufficient to pay up the hospital fund deficit. A great crowd of people was given a fine time and sent away to advertise Archibald's garage and to boost it throughout the surrounding country. This was done, bear in mind, in a village of about 1,800 population.

Is there any garageman who cannot

carry out some such plan in opening, reopening, or just giving a party because it pays?

A Garage of Many Departments.

Formerly a master plumber, Robert R. Suter, garage proprietor of the borough of Media, Pa., conducts his place of business on perhaps the strangest plan in the country. The "West End Garage," as he calls it, used to be a markethouse and is 80 by 125 feet.

Suter began with an ordinary storage business for passenger and commercial cars and worked up a good business. Soon he found that there was a demand among his customers for a repairshop. Consequently, he searched until he found some good mechanics who were willing to rent space in his garage because of the opportunity—readymade—to get trade from the car owners there. Thus Suter's customers

car agency applied for space for a sales and showroom. Suter obligingly had a portion of the front of the building suitably remodeled for this purpose and the car agency has been paying him good rent.

Suter had an interest in the People's Bottling Works, Inc., a concern manufacturing, bottling and distributing an orange cordial and some ten other brands of beverages. The business needed space; there was space in Suter's garage and, in short order, the bottling plant was established therein. A big Acme truck of 150 cases capacity is used in the distribution of the soft drinks. The truck is stored in Suter's garage.

There are separate meters in the building for the car washstand and the water supply for the bottling works, so that there will be no undue mistakes in charges.

Suter, who claims to be the originator of the community garage idea, has 62 small garages of this type in a cluster, a minor proportion of which are double garages. His car storage capacity is upwards of 150 cars.

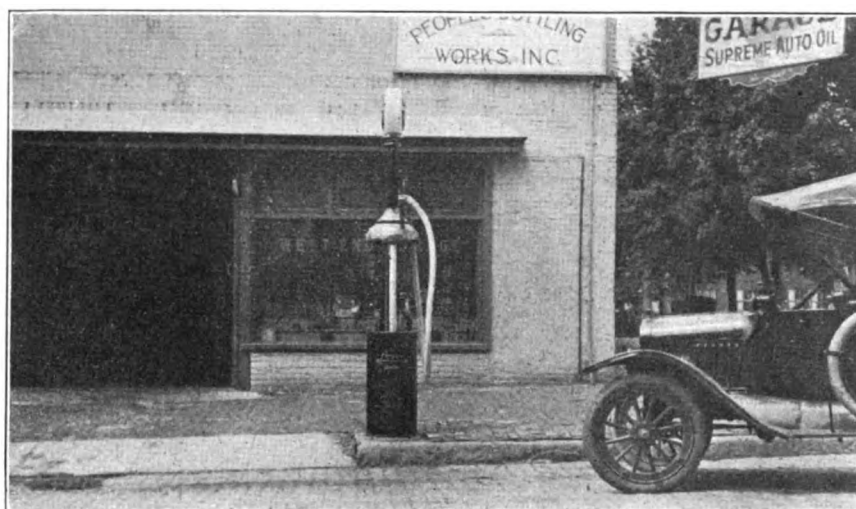
The Delaware County bus line, promoted by W. S. Kauffman, needed space for headquarters. A deal was soon made with Suter, and he accommodated the five large cream colored vehicles which run between Media, Newtown Square, Oxford, Kennett Square and Chester.

Since then, Suter has had overtures from an express company which wanted space in his garage and some potato growers were after room in the basement of the garage. He has been considering the addition of a second story to the building which will be used for a household furniture storage business.

Suter has only to operate his storage department, personally, and to attend to the sale of automotive equipment. While the men who lease space or departments from him are not in his employ or pay, they are, for their own interests, more than willing to oblige his customers. The community garage lessees look after themselves.

There are always enough mechanics in the repairshop to attend to the needs of Suter's storage customers. There are, in all, about a dozen men about the garage, besides Suter, who are constantly doing something—directly or indirectly—to boost his business.

Suter may have blazed the trail for copyists. He has no labor troubles, yet his customers are waited upon and accommodated to the last degree. He does not have to hire, fire or pay the men.



"West End Garage," Media, Pa., Which Has Been Successfully Departmentized.

were accommodated in that respect, this plan welding them more than ever to the garage.

Not wishing to be personally bothered with handling gasoline, oil and grease, and having no desire to wash cars himself, Suter hunted until he found a man anxious to engage in this end of the trade. He established a lubricating and washing division for the benefit of his customers, large gasoline pumps being placed outside and, just inside the big double doors on the right, a swing-arm wash-stand. The man who runs this division not only pays Suter for the privilege, but also hands him a 25 cent meter charge for every car washed.

But Suter was "cooking some more cabbage." Customers began to ask why he didn't keep tires and accessories.

He began to wonder why himself. So he soon had a neat office with stockrooms partitioned off in the front part of the garage, which were equipped with plenty of bins and shelves. Then he took a stock of automotive equipment to sell on commission. Again his customers were accommodated.

After a while the Cleveland and Chandler

How Repairs of Cord Tires Are Made

(Concluded from page 21.)

placed and all joints and holes built up and trimmed. The final cure is now made in two hitches, shifting the tire in the sectional mold between each.

Cable cord tires are usually repaired by methods differing greatly from any so far explained. Tires of this type are usually made up of two, three or four plies.

Construction of these tires varies greatly as to the way the cords are applied. The cords of the two-ply tire may be at right angles to each other while in the three-ply tire two may be at right angles and the third run straight across the tire. Most of the four-ply cable cord tires have each ply running at right angles to the one preceding.

The complete section repair depends almost entirely upon the ending of the cords at the beads. There are three methods of ending the plies in the two-ply tire. The Q. D. type employs a staple for each pair of cords. This staple is held in place by a split bead core, which is further secured with an extra bead cover.

The straight side type may have either of two methods. Both plies may meet at the toe of the bead, or the inside ply may extend to the heel of and be lapped by the outer ply which ends at the toe of the bead. The latter method has been used more in later years as it gives a better fastening for the cords. Each of these methods of ending is illustrated in Fig. 8.

Very little new material is needed for

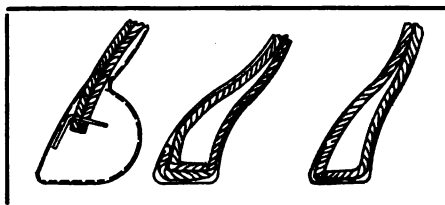


Fig. 8. Ways of Ending Plies.

repairing the cable cord tire. A few new cords of the conventional sizes are all that is necessary. Old cords may be used for repairing provided they are in good condition.

In repairing the two-ply cable cord, the entire repair to the carcass may be made from the inside of the tire. If the tire is of the Q. D. type, the bead cover is removed, the bead split and the broken or damaged cords removed. These are replaced after thoroughly cleaning and buffing the parts adjacent to the repair. One or two layers of thin cushion stock is used both behind and over the built-in material.

The three-ply tire of this type usually has all three plies ending at the toe of the bead. One ply comes down on the inside of the bead while the other two extend around the heel of the bead and meet the inside ply at the toe. In the four-ply tire, the construction is usually the same except that two plies are found on the inside of the bead core and two on the outside.

In tires of the three and four-ply types

all repairs may be made from the inside unless the outer ply is damaged. If this happens, it is necessary to lay back the bead and sidewall to make the repair. In any instance, the repair of cable cord tires consists in replacing damaged cords and securing them as they were originally. This type of tire is very easy to repair but takes considerable hard work. An excellent job of retreading may be done, as the cords of this size take the cement and new gum readily.

Fabric cord is sometimes used to repair cable cord tires, although its use should be discouraged. If it is necessary to use material of this kind in making a repair, an inside boot should be used. Where similar cables are used, the repair needs no reinforcement and an inside boot is rarely if ever used.

Cure for this type of tire is effected in the sectional mold or on the inside arm. The inside arm is very convenient to use if the repair has been made from the inside. Time and pressure are about the same as for other repairs of a similar nature.

The most common of the cord tire repairs have been mentioned and the repairman has only to use good judgment if a special case is brought in to repair. Fabric cord tire repairs are very similar to those of ordinary fabric tires, and the repair of cable cords is simply the replacement of damaged cords. The operations of either ought not to confuse a careful workman.

Care of Commutator and Brushes

(Concluded from page 28.)

armature is placed in the machine for operation. If the commutator is sufficiently wide it is sometimes best to bind the sandpaper by means of a string placed completely around the armature on each side of the brush-bearing surface.

It must be remembered that when the brushes are fitted by the method which has been described, the cutting is very rapid and the brushes should, therefore, be examined occasionally.

Another advantage of this method of fitting the brushes is that any play which may be between the brush and the commutator is taken up in the direction that it is taken up when the generator is in operation. The result is that the seat will conform to the seat made if the brush was allowed to wear in by the use of the continual running of the generator.

It is sometimes advisable to nose off or file the knife edge of the brush as this will greatly reduce breakage. In a number of instruments the mica on the commutator

is supposed to be flush with the commutator bars. This should be left in all cases when it is recommended by the manufacturer and does not give trouble.

In cases where mica is undercut the slots should be kept clean. If they are scraped out with a metallic tool the edges of the commutator bars should be smoothed down before placing the instrument in operation. Scraping tools made of fiber or hard wood are much more desirable for this purpose than metallic tools, as this will prevent sharp edges from being formed on the commutator segments. The slots need not be very deep. For all practical and theoretical purposes the mica need be only a hair's breadth below the surface of the commutator.

Of course, if the commutator is subjected to rather fast wear, it is best to undercut a little more so that the operation will not be necessary for some time to come. If the slots are cut too deep, the metal of the commutator bar has a tendency to drag into

the undercut and this will eventually short two segments, resulting as a rule in unsoldered commutator connections or burnt out windings in the armature.

Automotive commutators should be kept clean from oil and grease. Oils have a destructive effect on the mica and if this insulating quality is once broken down the segments will be shorted. Kerosene especially, is very destructive to the mica insulation. If it is desired to clean the oil from the commutator, a little gasoline can be placed on a rag and held against the commutator.

Almost all automobile brushes are self-lubricating, in that the brush contains sufficient lubricant to prevent excessive wearing between the commutator and the brush. Consequently, there is no need for oiling the commutator.

The table given in this article lists the troubles which are apt to occur in automotive generators and starters—and suggests remedies therefor.

A SMALL CAPITAL PLUS GRIT AND HUSTLE.

(Concluded from page 20.)

bumper, motor meter, spotlight, or something which this particular customer does not have. A customer who has a bumper never gets a bumper circular nor does a customer who does not need tires get a tire letter or circular. The mailing list shows the items the car owner needs and the items he already has.

Customers who have not had the valves in the engine ground and refitted for months get personal letters on valves, telling why valves should be ground in order to save fuel and increase power.

Those who have driven their cars for months without having the crankcase washed out and filled with new oil, get letters telling them why this should not be neglected. Advertising matter pertaining to a good oil is enclosed with this letter, together with something on grease guns and other greases used about the car.

A small tract of ground, inside the city limits, is leased and kept up by Ted for the benefit of customers and tourists for picnicking and camping purposes. A large oven, made of brick, is centrally located and various tables and benches are furnished. A small building is equipped with a shower bath for tourists and a playground for children is provided, having swings, "teeter-totters," slides, etc. At one side of the camping ground is a tennis court and, posted at one end of the court, is a well-painted sign inviting the tourists to call at the garage for rackets and balls.

Four small cottages, furnished with steel cots and electric lights, are also in the park and a neat sign asking those with tents to refrain from using the cottages if there are tourists in the park who do not have camping equipment.

Free air is also supplied to the tourist in the park, as a portable, automatic, electric air pump and tank are available in an enclosure erected for the purpose.

At first, one might wonder if this expenditure has paid, but it is needless to say that it does. Tourists break camp in the morning after using the camping ground and drive straight to Ted's garage to buy everything of Ted that they have use for, feeling that one good turn deserves another. While they are buying gasoline or oil, the tires are tested, radiators filled, etc., by a boy whose business it is to look after those things.

Many tires, chains, tubes, extra spark-plugs, tourist tool kits, and other items are sold that the tourist needed but would never have thought of buying if Ted had not asked them to buy.

The tourists register their names and addresses at the camping ground and, about thirty days after the date of registering, letters are sent to their home addresses asking them to return again and to speak a good word to those of their friends who

may contemplate touring westward. Ted says it is surprising the way these people advertise the garage and camping ground by passing information about them on to their friends.

Aside from the tourists who use the camping ground, churches and lodges make good use of it for little picnic parties, etc., and they, like the tourist, feel it their duty to call at Ted's garage when their "gasolene buggies" need a doctor.

There are many ways to "Ask Folks to Buy," and the man who plays woodpecker and uses his head usually gets his share of the business, regardless of where he is located. A little capital, and a lot of grit and hustle, will work wonders in these days of competition.

Bureau of Mines Reports Better Grade of Gasolene Being Sold.

Results of the semi-annual motor gasolene survey, just concluded by the United States Bureau of Mines, indicate that the average gasolene sold in the country is of a better grade than has heretofore been the case. Laboratory tests of motor gasolenes sold in New York, Washington, Pittsburgh, Chicago, New Orleans, St. Louis, Denver, Salt Lake City, San Francisco, and Bartlesville, Okla., during the month of July, show that this year's gasolene is much more volatile than that sold two years ago, and that it has a somewhat better distillation range than last summer's samples.

Increase in volatility of gasolene means an increase in its rapidity and intensity of explosion. It means that the "old bus" will be easier to start on a snappy December morning. It means also that less carbon residue will be found clogging the cylinders.

A comparison of the average figures compiled by the Bureau of Mines during the past several years shows that engine gasolene is also becoming more uniform in character. The large seasonal change is disappearing, but "winter gasolene" still has a lower initial boiling point than "summer gasolene." This difference in volatility is made intentionally to facilitate starting the motor in cold weather. The end point shown in the present survey is slightly lower either than that of last winter or of the summer of 1921.

The average of the entire country, considered as a whole, does not show much change from a year ago, but samples from individual cities show some distinct changes. Of 132 samples collected by the Bureau of Mines in the present survey, ten failed to meet federal specifications as regards the initial boiling point of 140 degrees F., and 61 samples failed at the 90 per cent point, 374 degrees F.

The semi-annual motor gasolene survey just completed is the sixth made by the Bureau of Mines. Detailed figures giving the results of the survey in each of the cities above named appear in Serial 2388, which may be obtained from the Bureau of Mines, Washington, D. C.

British Automotive Factories Show Greatly Lowered Production.

British automotive factories were turning out only about ten per cent of their capacity production during the first quarter of 1922, says W. M. Park, secretary of the American Trade Commissioner, London, in a report to the automotive division of the Department of Commerce. This small production has been due to the fact that their export markets are greatly diminished and manufacturers have been almost totally dependent on the home demand.

Many firms have been working even below this percentage and the ten per cent average was accounted for only through the activity of some of the builders of light cars, which at present enjoy a vogue in the British home market.

Reports from such important manufacturing centers as Birmingham, Coventry and Wolverhampton state that unfinished work is lying about the shops and, in order to maintain balance in the various departments, working hours have had to be reduced.

WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 27.)

devices used in preheating various jobs should enable the ingenious torch operator to devise some means of heating almost any casting that may come to his shop, whether he has special facilities for handling the work or not. Once he grasps the idea he should have no trouble in finding a plan for preheating the job.

TROUBLE SHOOTING, THE ELECTRIC CIRCUIT.

(Concluded from page 25.)

ing circuit, or it indicates that there is some cause that prevents the starter from cranking the engine due to mechanical resistance.

If there are shorts or grounds in any of the circuits, we now know which circuit contains them. If the generator and charging system are not doing their work or if there are open circuits in this part of the equipment, the third test has shown the circuit in which trouble exists. We are now ready to go after the exact trouble that has caused the battery to become discharged when such trouble is in the lighting, starting, charging, ignition or accessory circuits.

Having limited our work to one certain circuit, it is next in order to determine whether the trouble is in the wiring for that circuit or in the electrical units included in the circuit. The same principles of locating troubles in wiring apply to all circuits, regardless of their purpose.

Special tests are called for in locating troubles in the electrical units such as the generator, the cut-out, the regulator, the starter, coils, etc. The next installment of this series will cover the quickest methods for locating shorts, grounds, opens and points of high resistance in the external parts of all circuits.



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Don't be content with an ordinary salary when you can get *big money* in the auto game. This is the biggest year in the history of the automobile industry. Thousands of men who know something about cars are needed to keep them in repair. Big jobs are open everywhere. Get into the game and open a garage of your own.

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Practical Hints for Shop Mechanics

A Home-Made Battery Steamer.

The illustrations serve to show the construction of a battery steamer, for softening the sealing compound of storage batteries, which was recently made by the writer. Though most of the parts were made from odds and ends found lying around the shop, the results obtained compare very favorably with those of the purchased article.

The completed apparatus, shown at *A*, in Fig. 1, consists of a steam box, into which the battery is placed, and a boiler which is used to generate the steam, a flexible hose joining the two.

The steam box is made of common pine lumber, coated inside and outside with asphaltum paint to resist the effects of acid which may be spilled upon it. The dimensions of the box are determined by the amount of such work to be done. If the amount of work warrants it, the box may be made of a size to accommodate two batteries at one time—otherwise, it is advisable to construct it as small as possible, to avoid the waste of steam.

The interesting feature of the box is the method of clamping the lid to secure a steam-tight joint. A piece of old leather belting is tacked all around the upper edge of the box, acting as a gasket when the lid is clamped on. The lid is not carried on hinges but is left free so that it may be removed and placed aside. This makes it more convenient to remove the sealing compound from the battery without lifting the battery from the box.

At *B*, in Fig. 1, is shown the construction of the clamps used to draw down the lid. Procuring four old hinges, one side of each was cut off a short distance from the joint. A piece of angle iron, carrying a thumb-screw, was then riveted to the short side of each hinge. On the lid of the box, at the point where the thumb-screws bear, four pieces of flat iron, bent to form a flange on one side, were screwed.

These pieces prevent the thumb-screws

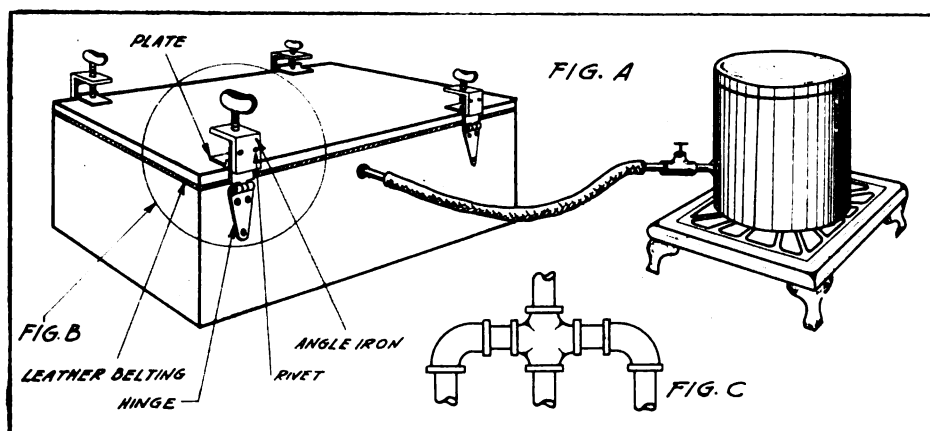
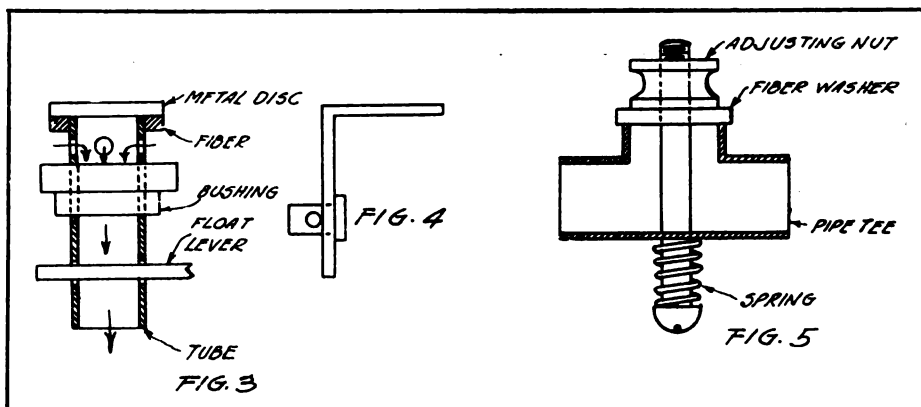


Fig. 1. Home-Made Battery Steamer; Construction of Clamps; and Special Attachment.



Figs. 3, 4 and 5. Water-Valve Construction; Float Lever Connection; and Safety-Valve.

from digging into the wood, and serve to keep the hinged clamps from slipping off when the thumb-screws are tightened. When the lid is to be removed, the thumb-screws are loosened only enough to clear the flanges on the iron plates. The clamps

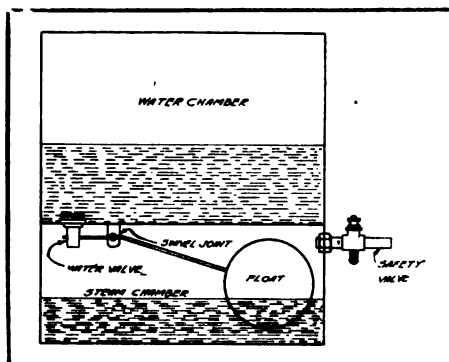


Fig. 2. Shows Construction of Steam Generator.

may then be dropped back, clear of the lid, permitting easy removal.

Though originally intended for steaming the entire battery, it was found desirable on occasions to steam only certain cells. For this purpose, the attachment shown at *C*, in Fig. 1, has been found useful. Made of pipe fittings, this attachment is connected to the hose on the steam generator,

while each of the three short nipples carries a short length of hose leading to the cells to be opened.

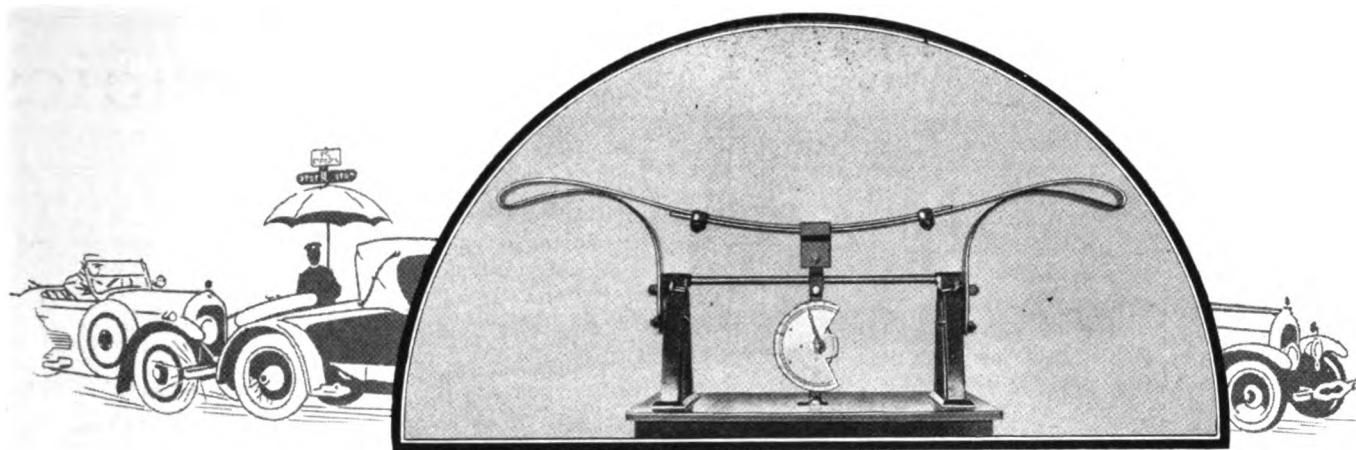
When only two cells are to be opened, the third hose is pinched with a clamp to prevent the escape of steam. With this attachment, it is possible to steam a single cell in three different batteries simultaneously.

Fig. 2 shows the construction of the steam generator. Constructed to operate automatically, it consists of two chambers—the upper to hold the water which feeds the lower chamber, in which the steam is generated. These two chambers were made of two cracker or cake cans, which can usually be procured at the corner grocery store for a few cents.

The can which was used for the steam chamber was cut down to about half its height. This reduces the steam space and causes the steam to more quickly reach the steam box. The lid from the lower can was soldered to the under side of the upper can, so that the upper can may be placed on the lower and still retain practically a steamtight joint. The height of the water in the steam chamber is regulated by a float which operates the water valve in the water chamber. On the apparatus built by the writer, an empty hand-soap can was used for a float, after soldering on the lid.

The construction of the water valve is shown in Fig. 3, in which the valve is shown in its open position. A brass bushing, as shown, is soldered into the bottom of the water chamber. A piece of brass tubing, closed on the upper end by a metal disk and carrying a fiber washer, slides freely in the bushing. Four small holes are drilled in the tube directly under the fiber washer.

The lower end of the tube is drilled to receive the end of the float lever. When the water in the steam chamber reaches a predetermined height, the float rises, causing the tube to move downward, until the fiber washer seats on the bushing.



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HERE'S a Lyon Spring Bumper bending eight inches under a strain of 2,200 pounds. This is the test that started such a lot of talk at last winter's auto shows. Can you imagine any other type of bumper standing up under this punishment?

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Lyon Spring Bumpers are perfectly balanced, beautifully designed and reasonably priced. And bear in mind that they are backed by a strong, consistent national advertising. Moreover, we provide Lyon dealers with window signs, miniature models, display racks, direct matter to customers and other tried and proved ways of helping to create sales.

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LYON RESILIENT BUMPERS

In Fig. 2, the valve is shown closed. As the water in the steam chamber boils away, the float drops and the valve rises until the four holes in the tube clear the edge of the bushing. This permits the water to pass through the holes and down through the tube into the steam chamber, as shown by the arrows in Fig. 3. This action continues automatically as long as heat is applied under the steam chamber.

The float lever is carried on a swivel joint, which is nothing more than a piece of angle iron carrying a stud which is drilled to receive the float lever, as shown in Fig. 4.

As the generation of the steam is continuous, it is necessary to provide some means for keeping the steam pressure within safe limits. For this purpose a safety valve, as shown in Fig. 5, is attached to the steam chamber. This safety valve is made from a pipe tee, drilled to receive a screw which carries a fiber washer and an adjusting nut.

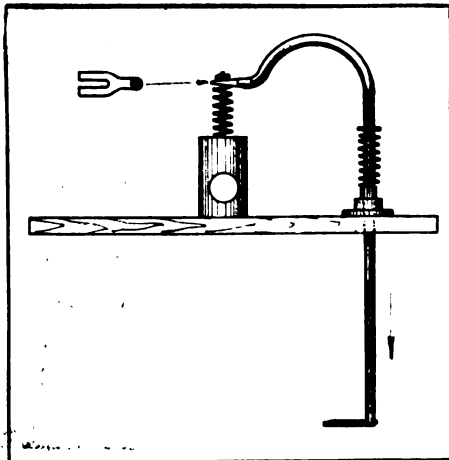
A spring placed under the head of the screw causes the fiber washer to seat on the central outlet of the pipe tee. When the steam box becomes filled, the pressure of the steam lifts the fiber washer from its seat, permitting the escape of the excess steam, and preventing the explosion of the steam chamber.

When not used for battery steaming, this apparatus may be used for distilling water, for use in filling batteries.—E. K., Minn.

Assembly of Overhead Valve Cages.

Valves of an overhead-valve type of engine are removed by first taking out the valve cage and disassembling the cage at the bench. It is not easy to compress the valve spring to remove the locking pin, and the mechanic will welcome the fixture shown in the illustration.

The fixture is mounted at a convenient place on the bench. A pipe floor flange, with a short length of pipe screwed in, serves as a vertical guide and is fastened to the top of the bench with wood-screws. A fork, wide enough to clear the valve stem, is forged in the end of a round bar



Helpful for Compressing Valve Springs.

that is a neat sliding fit in the pipe used for a guide.

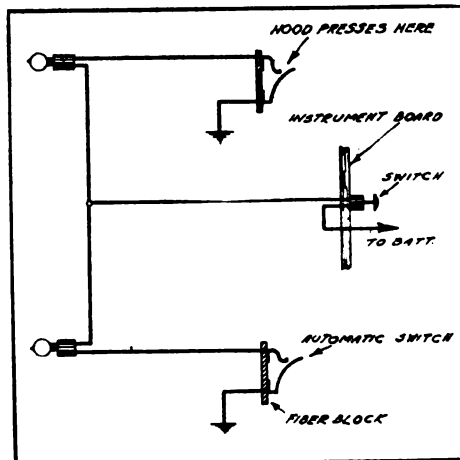
This end of the bar is bent into a U shape, and a hole for the spring pin is drilled. An old valve spring, between the pipe and the spring pin, serves to hold the bar up. A foot pedal is fastened to the lower end of the bar with cap-screws.

A valve spring may be compressed by placing the cage under the fork and pushing down on the pedal with the foot. This leaves both of the mechanic's hands free to work on the valve.—L. R. B., Iowa.

Automatic Engine Lights.

With two lamp sockets placed on the dash under the hood—one on each side of the motor—an automatic switch is constructed that will light these lamps when the hood is raised.

The switches are made from a fiber block, and brass strips are located where the hood will press upon the brass springs and open



Lights Lamps When Hood is Raised.

the circuit, when the hood is closed. A switch is located on each side of the dash. A third switch is located on the instrument board, so that the lamps can be used only when necessary.—P. A. B., Pa.

Crankshaft Starting Pin.

Cut a piece of $\frac{3}{8}$ -inch rod the same length as the regular Ford crankshaft starting pin and slot one end with a hacksaw, about $\frac{1}{2}$ -inch back. Slip this through the fan pulley and crankshaft and spread the slot with a chisel.

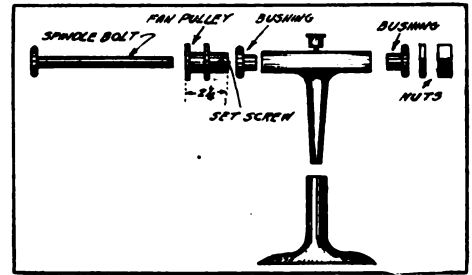
This pin is much easier to put in than the standard pin, as it is not necessary to use a cotter.—D. & F., Mo.

Grinder for Shop Use.

I am sending a diagram and instructions for making an inexpensive small grinder for shop use. All the parts, except two bushings and bolt nuts, came out of the scrap box.

The parts needed are: One old Ford spindle body; one old Ford fan pulley, cut off $2\frac{1}{4}$ inches, inside end driven out; one old

screw-jack body, 6 inches high; one set-screw; one spindle bolt, new; two nuts to fit, one cut thin; two spindle-body bushings, new; and one grease cup, which can be found in the scrap box. You will also need



Inexpensive Grinder for Shop Use.

some lead to run in the bottom of the stand to hold the spindle steady.—E. H. W., N. Y.

An Eight-Wheeled Ford.

Remove hubs from four old wheels. Use a piece of wood two inches thick and ten inches square. Drill holes the same as in the hub. Remove the distant plate of wheel on the car, reverse it, and put outside. Put the wood in between the wheels.

Put $\frac{3}{8}$ -inch by 6-inch bolts through the entire assembly. Punch holes square in brake drums, and put bolts in from the inside. Use carriage bolts. Cut three pieces of wood one inch thick, four feet long and three inches wide. Place at equal distances between the rims. Drill $\frac{1}{4}$ -inch holes and put the bolts in.

You can go anywhere and just as fast as with a single-wheeled Ford. It will go over snow and on mud where others cannot go. Use extra long cross links to make chain. Use a roadster and you can follow a sled all day.—C. A. M., N. Dak.

Cleaning Spark-Plugs.

Carbon sticks most easily to any rough surface and the practice of scraping porcelains and electrodes of spark-plugs with a knife or polishing with emery cloth is apt to provide a good place for the carbon to deposit.

A far better method, and one that will not scratch the surfaces, is to use steel wool. Soften the carbon with a liberal application of kerosene and the steel wool will do the rest.—B. R., Iowa.

Pulley Lagging.

We find that oftentimes a belt is inclined to slip on a pulley in the shop. This was made impossible by lagging the plain pulleys with parts of an old casing.

First, cut off the bead and part of the sidewall of the old tire. Drill a few $3/16$ -inch holes in the pulley and rivet the cover on so that the raised portion of the tread is in the center of the pulley. This makes a pulley covering with extra long life.—L. M., Mo.

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The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En-ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.

It is **not** given away.

It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

This service is supplied only to dealers who sell En-ar-co brands. The Boy and Slate Sign and every one of the epigrams are copyrighted.

There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

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Readers' Questions and Answers

Retard and Advance of Generator.

How do you retard and advance the generator on the Dodge car?—W. H. W. Co., Ind.

You can regulate the charging rate on the Northeast generator used on the Dodge car by shifting the third brush. If the brush is moved in the same direction as that of the armature rotation, the output will be increased. If it is moved in the opposite direction, the output will be decreased.

The charging rate on these generators should never be set to an output below four amperes nor higher than ten amperes. A charging rate of about eight amperes is ideal for average conditions.

* * *

"Fire and Flash Point" of Oils.

What is meant by the "fire and flash point" of oils? How is such a test conducted?—A. L. M., Neb.

Oil to be tested for fire and flash points should be placed in a small cup, and then set into a larger cup which contains sand that can be packed under and around the smaller cup. Special receptacles can be obtained for this purpose at any chemical supply store.

Then the cups are placed over a gas jet and heated slowly. The sand distributes the heat evenly to the inner cup. A thermometer should be placed in the oil but protected from the flame. A lighted match should be passed over the oil at frequent intervals until a faint flash is produced, and the temperature should be read and recorded as the flash point when this takes place.

If the process is continued, the flashes will become larger and finally the oil will continue to burn and this is called the burning point. The flash point should be at least 350 degrees Fahrenheit, and the burning point at least 50 degrees higher.

* * *

Chevrolet Clutch Trouble.

The clutch on a Chevrolet model 490 car which we have in the shop did not work properly, so we relined it but it seemed worse and the cone soon broke. A peculiar rattle developed about the time that the clutch trouble began and continued to grow louder until the cone broke. Can you explain the causes for this trouble?—S. E. G., Iowa.

The trouble was probably caused by the engine and transmission being out of line vertically. This trouble can be remedied by shimmying up the engine or transmission as the case may require. Shims for this purpose can be obtained from the Chevrolet company.

It seems likely that the rattle you noticed was caused by the drive ring on the square shaft at the front of the gear box and will

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Ask questions when in doubt.

The more you ask about your business, the more you will know—and the more you know, the more money you will make.

Whether you are a dealer, a salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

disappear as soon as the engine and transmission are in line. Such a rattle usually gives the driver warning before the trouble is serious.

* * *

The Occupational Tax.

I am a reader of your magazine, buying it at whatever point I happen to be, having no permanent address up to the present time. I am, however, going to travel this state with a line of automobile sundries and hope to have a definite address where I can subscribe for it. Your readers' questions and answers are of great interest as well as help to me.

Now this city has just passed a new ordinance, requiring an occupational tax from everyone. I shall appreciate it if you will let me know if they can make a salesman pay a tax when he acts as an agent or salesman for a firm, taking orders for its goods but not carrying a stock of goods on hand, the orders being sent outside of the state to the manufacturer located outside of the state to be filled by him direct to the party ordering.

I go from place to place, taking orders and sending them in to the factory to be filled by it direct.

Can this city compel me to pay them a tax—as I am a resident or hope to be shortly—on the business I get in this city, as well as in the other sections of this state?

They say they require me to take out an

agent's license at a cost of \$25 per year, although I carry no stock of goods and sell by sample, sending the orders taken outside of the state to be filled direct by the firm.

Would it make any difference if I carried a stock or not, just so I did not sell and deliver at the same time?—A. H. T., N. C.

It is impossible to answer your inquiry specifically without having the language of that part of the ordinance which defines "agents" who are to be licensed.

You are not an itinerant merchant, and you may not be compelled to take a license as such but, depending upon the language of the ordinance, you may possibly have to take out the license to permit you to do business in the city.

The power of a city to impose an occupational tax rests upon two general propositions of the law: (1) that it is a valuable privilege to live in a city and carry on business there and for that privilege and the protection the city affords by means of its police, etc., as well as for the many other conveniences such as paved streets, public parks and so on, the resident person engaged in the occupation should pay; (2) that it is part of the inherent police power of a city to regulate and control the businesses carried on without the city as carrying out its duty to protect the morals, health and comfort of its citizens.

There is the further consideration that a city may raise money by taxation, but the right to license an occupation, while it does result in raising revenue, is based on the two propositions mentioned.

It is generally held that, in order for an occupational license provision in an ordinance to be valid, the rates must be equal to all and make no discrimination between resident and non-resident persons, being based on the *doing of business within the city* and not on residence. But where an ordinance imposes a tax on resident occupations only, the person to be liable must be a resident and must carry on the occupation in the city. As a general proposition, a license may not be required for doing business outside of the city, though one live within it.

We assume that you do not maintain an office in the city mentioned, and it is our opinion that so long as you merely live there and do not carry on the business, trade or occupation within that city by selling the articles you handle to its own residents, the attempt to compel you to take out a license could be successfully resisted in the courts.

If, however, you carry on a correspondence from your residence with customers, or mail in your orders from there, or in any other way perform acts incident to the business, trade or calling in which you are

What Are You In Business for---

Profiting most by serving best explains the success of the Dealer in CON-O-CO PROCESS Motor Oils.

Older than business itself is the truth that a good product endures and its patrons multiply. QUALITY in oils must begin at the beginning—it must be in the crude. CON-O-CO PROCESS Motor Oils are high grade PURE PENNSYLVANIA lubricants.

CON-O-CO PROCESS Motor Oils are your opportunity. They are not only vastly different from but far superior to ordinary motor oils.

CON-O-CO PROCESS is not a light oil compounded with a heavy cylinder stock, as are general run oils offered on the market. They are wholly distilled—PURE PENNSYLVANIA—therefore free of any gummy residue to cause

hard carbon deposits, leaky valves, dirty spark plugs, and other troubles.

CON-O-CO PROCESS is made in seven refined types with the skill of expert analytical chemists in oils.

WHY HANDLE "just oils" WHEN YOU CAN HAVE THE BUSINESS CERTAINTY OF CON-O-CO PROCESS MOTOR OILS.

If your name is not on our books, permit us to show you. Let us quote you some interesting dealers' prices.

CONSUMERS' GUARANTEE—Buy it, try it, return it, without charge, if you are not satisfied. You are the sole judge. You will understand that such a broad guarantee is only possible because of the exceptional quality of CON-O-CO Products.

Write or Wire

Refineries
Cleveland, O.
Chicago, Ill.

Consumers Oil Company
225 No. Michigan Ave., Chicago, Ill.

Refineries
Pittsburgh, Pa.
Coraopolis, Pa.

BRUNNER

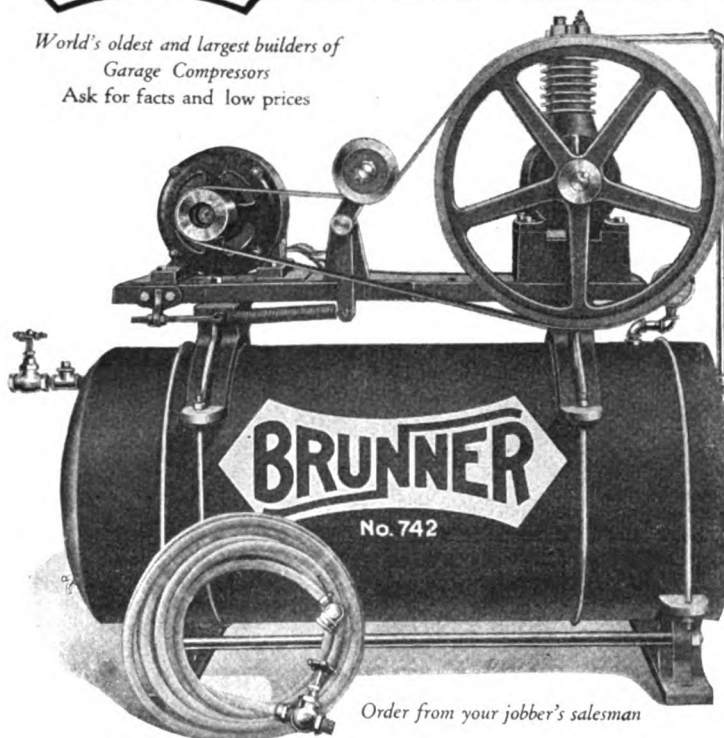
*World's oldest and largest builders of
Garage Compressors
Ask for facts and low prices*

WHERE EVERY BRUNNER EXCELS

1. All running surfaces and bearings ground.
2. Evenly balanced piston loads.
3. Any model can be rebuilt to several oversizes.
4. Easy replacement with standardized parts.
5. Valves and fittings non-corroding brass.
6. Absence of vibration, noise or loose joints.
7. A Brunner lasts twenty years or more.

BRUNNER MFG. CO.,
UTICA, N. Y.

Sales Offices: Utica, Cincinnati, Kansas
City, San Francisco



Order from your jobber's salesman

Ask an Engineer

engaged, an occupational tax may be imposed upon you and collected.

For instance, "A merchant tailor or his agent who sells by sample, taking measures and orders which are sent to another state, is liable to a privilege tax."—Singleton vs. Fritsch, 4 Lea (Tenn.) 93. Again, "To authorize a person to sell foreign merchandise without a license, he must have received it in exchange for articles of his own manufacture or for produce of his own agriculture."—Colson vs. State, 7 Blackf. (Indiana) 590.

The latter is based on the idea that one may not be taxed for selling his own agricultural or manufactured products, and selling what he has taken in exchange is the same as selling the original product.

"One who acts as agent for a non-resident firm and takes orders for future delivery, the packages being made up by the firm and shipped to the agent for delivery and collection, is not an itinerant merchant and may not be taxed as such."—Naegle vs. Centralia, 81 Ill. App., 334. But he might be taxed as an agent.

You ask whether it would make any difference as to your carrying a stock. From what has already been said, it will be clear that it does make a difference. Having the stock on hand would necessarily entail acts which would be part of the business or calling being performed within the city.

* * *

Use of Steam to Open Batteries.

Why do some battery manufacturers say not to use steam when opening their batteries? How should such a battery be opened?—G. H. R., Pa.

Some batteries use a composition separator that steam would damage, so some other means of opening should be used.

A blowtorch can be used to soften the sealing compound, if it is kept moving about so the compound will not be heated to the point that it will burn.

An electric opener, which consists of a box into which the battery is placed and a lid upon which heating coils and a reflector are so placed as to direct the heat on the top of the battery, will open all types of automobile batteries very quickly and conveniently.

* * *

Ford Magneto Voltage.

How many volts will a Ford magneto generate if the car is driven at 20 miles an hour? This is a 1914 Ford.—R. L., Wis.

If a 1914 Ford car is driven at a car speed of 20 miles per hour, the engine will be running at 800 r.p.m., and the magneto will be producing 20 volts.

* * *

Carbon Under Intake Valves.

What will cause pieces of carbon to stick under the intake valves of a four-cylinder engine and hold the valves open? The engine is four years old and did not give this trouble until after it was overhauled some time ago.—W. L. A., Cal.

The carbon must first be deposited by oil

pumping, poor oil, poor carburetion, or similar causes.

If the valve clearance is too little, the valves will not close properly when hot and there will be more or less carbon deposited on the seat in some instances, but it is not really the carbon that is holding the valve open. Carbon deposits on the intake stem

Now It's Your Turn.

In answering these queries concerning the difficulties arising in garage work, we have given the generally approved methods.

But we realize that many of our readers will have a different way of "doing the trick," and can offer interesting and helpful suggestions from a different angle. So we would like to have you tell us whenever you have a different method for handling these various questions.

Let's make this a Round Table for the exchange of ideas and thus be mutually helpful!

will often wedge into the valve guide and hold open the valve.

If the valves have been ground several times without refacing, the face or contact surface becomes wide and consequently will not crush a piece of carbon as easily as if a narrow face were used.

* * *

Correcting Transmission End Play.

My Ford sedan, model 20, does not charge the battery. Can I get the generator off without taking out the engine? The transmission has about 1-8-inch end play and the clutch seems to slip sometimes. Can the end bearing be put in the transmission without taking out the engine?—R. P., Ont.

The generator can be removed from a Ford in a few minutes by unbolting and sliding backwards. A common cause for not charging is a dirty commutator, so it might be well to clean it by holding a piece of fine sandpaper against it when running slowly, before taking the generator apart or from the engine.

The high-speed clutch can be tightened by removing the transmission cover and turning the screws in the clutch fingers. These screws are locked by cotter keys and care should be used when removing the keys because, if one is dropped, it might short the magneto and cause the engine to have to be torn down.

To tighten the clutch, the screws should be turned into the fingers from a half to a turn farther. Each screw should be turned the same amount.

We are not sure of your meaning when you speak of end play in the transmission and of the end bearing. There are a number of bearings and bushings in the transmission and, if they are worn, the end and side motion will be noticeable.

Probably your trouble is caused by worn

main bearings, which allow the transmission and crankshaft to have end play. This can be corrected by replacing the main bearings, or at least the rear main-bearing cap but this would require the engine to be torn down.

There are several devices on the market, that any dealer will be glad to tell you about, which will take care of the end play. However, if your bearings are worn enough to allow 1-8-inch end play, they are no doubt worn in other directions and, as you mention several other signs of wear, your best and cheapest remedy is, no doubt, a complete overhaul.

* * *

Battery Charging Rate.

What is the charging rate of the 12-volt, 6-cell storage battery of a 1916 Maxwell car?—E. M., Fla.

As the electrical system on the 1916 Maxwell uses 12 volts for starting and charges at six volts, the battery must then be considered as two 6-volt batteries.

The charging rate should be between 10 and 14 amperes. The batteries are connected in series when they are used for starting and in parallel when being charged. Only one-half of the maximum charging current will be charging each 6-volt battery.

* * *

Incorrect Float Adjustment.

What will cause an engine which is equipped with a Zenith carburetor to get a lean mixture at low and medium speeds? I have cleaned the compensating nozzle and replaced it with a larger one, but the trouble is still bad. The engine operates well at high speed.—A. J. M., Ind.

Your trouble is probably due to the adjustment of the float.

In this carburetor, the amount of fuel that flows through the compensating jet is not only governed by the size of the opening but also by the pressure upon it which is caused by the height of the fuel in the float chamber.

The fuel level can be changed by sliding the small collar which is located near the top of the needle.

* * *

Removing Old Paint.

Please tell me the best way to remove old paint from an automobile.—B. G., Minn.

There are certain liquids which may be purchased at almost any painters' supply store that will soften the old paint almost instantly, after which it may be removed very quickly with an ordinary wide putty knife or scraper. Directions for applying the liquid will be found on the container of the liquid.

The old paint may also be sanded off with sandpaper, but this is a very long, tedious job.

The flame of a blowtorch may help greatly on some parts of the car.

Caution should be used in bringing the flame near gasoline connections or where gasoline may be ignited.




Do you know what a Flexlume Sign will do?


A FLEXLUME Electric Sign will give you forceful advertising at a cost of only a few cents a day. It will work for you day and night, for Flexlumes are day signs as well as night signs. It will give your store front a quality atmosphere, it will carry your message to the thousands who pass, all of which means that a Flexlume will increase your business.

Let us send you a sketch showing a FLEXLUME to meet your particular needs.

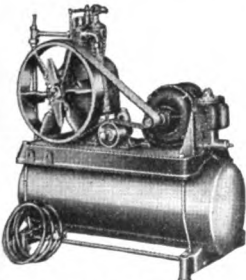
FLEXLUME CORPORATION
25 Kail St. Buffalo, N. Y.



CURTIS
AIR COMPRESSORS-HOISTS-TROLLEYS-CRANES
ST. LOUIS
Established 1854



Style "S"
Single-Stage Outfit
Belted only—five sizes, $\frac{1}{4}$ to 3 h. p. complete, less driving power.



Style "V"
Two-Stage Outfit
Sizes $\frac{1}{4}$ to 2 h. p. Furnished with automatic starter. A. C. or D. C. motor.

"An Original Design"

YOU can purchase a Curtis Outfit with all the confidence that goes with a well-known, thoroughly established and reliable product. Sixty-nine years of experience, over twenty-six of which have been devoted to the manufacture of air compressors, have enabled Curtis engineers to develop an entirely original design based on sound engineering principles.

First and Only Two-Stage Air Compressor With a Copper Intercooler

Curtis Single-Stage Compressors have controlled splash oiling system—no excess oil to rot tubes. Big saving in oil. Fan flywheel aids in keeping cylinder cool; increases capacity. Hand unloader prevents blowing fuses and jumping belt, and many other exclusive features. Several styles and sizes.

Curtis Two-Stage Compressors have all features of the single stage. Exclusive aeroplane-type copper intercooler assures fullest advantage of two-stage compression. They are perfectly balanced so that the crankshaft bears a uniform load—this assures less vibration and wear. Several styles and capacities. For full information use coupon, or a postal will do.

Curtis Pneumatic Machinery Co.

1515 Kienlen Avenue, St. Louis, Mo.

Branch Office: 530-U Hudson Terminal
New York City

Canadian Representative: Joseph St. Mars
Winnipeg and Toronto, Canada

CURTIS *Single and Two Stage*
Air Compressors

1515
Send
Coupon

Curtis
Pneumatic
Machinery Co.

Gentlemen:
Please send me descriptive
folder and full particulars on
Curtis Air Compressors.

Name

Address

Jobber's Name

Address

Here and There in the Motor World

A Man Who Has Made "Miles of Smiles" for the World.

Said one, "I don't see how he does it." "No more do I," agreed a second, and then one who knew told us the story of the man of whom it has been said that he holds the world's record for "being funny."

We all like to hark back once in a while to the good old days when, with books under arm or swinging on a strap, we trudged along to school with Bill and Tom and "Chuck" and the rest of the good old gang.

Always with the memories of the old schoolhouse come memories of the blackboard. Was there ever anything that offered a better chance for "guying" Tom or Dick or Harry, or tracing some crude but funny caricature that brought a responsive giggle from the rest of "the bunch" when teacher's back was turned?

It is this irresistible appeal of early boyhood wit, together with the searching power of the epigram, that Charles H. Archbold has combined into one of the most effective and original business-building business mediums ever known.

All over the country, you will see the impish, grinning face of the "Schoolboy" peering over the top of his huge slate, on which is written some one of the innumerable epigrams which the fertile brain of this master fun maker has given to his pen.

An immense boy he is—this schoolboy—standing sturdy and strong, a full six feet in height, but then he has to be big for it's a great big, life-sized job that he's got to do. He entertains while he advises; he sells while he hands on to you some bit of philosophy; and sometimes he startles you with some uncanny bit of timely humor that seems almost to hint at a foreknowledge of events to come, as, for instance, the following:

A glimpse at the scrapbook, in which Archbold has collected some of the letters he has received from people in many different parts of the country commenting on the "boy and slate," revealed this one from a woman in the far west:

"Dear Sir: Last Sunday I was running for a car and missed it. I was furious and just then happened to see your sign which said: 'Many run fast enough, but not soon enough.' It made me cool off, but it seemed almost uncanny to have it appear at that very moment."

And, by the way, Archbold has a rather unique method of testing the wit of his epigrams. "A joke's a joke the country over," he says—and he's written some five thousand or more—"It doesn't much matter where people live or what color they are, they all have the same human problems and that's how I know that if my joke works on the office staff it's going to work on

those folks who go to the Hudson Bay Co.'s most northern trading post."

Therefore, every other day, the office staff crowds around its own boy and blackboard and watches Archbold chalk on his latest. Then he keeps his back turned and listens.

If there is a gale of mirth that grows into a regular roar that threatens to bring down the roof and does bring the manager himself hurrying from his office anxious to learn just how much damage the explosion has done—and then to remain and join in the fun—the author of the day's wit knows that all is well with the world. But if only a polite ripple of hilarity greets his offspring, Archbold just uses water, shows no hurt feelings, and tries another.

To those who ask how he happened to hit upon the idea of the witty schoolboy and his slate, Archbold has given his story somewhat as follows:

"I am a Hoosier product, born and educated in Indiana, where I stayed until quite a youth. I was in business with my father in a grocery store when a macaroni company whose goods we handled offered a prize for the best slogan. I won the prize—fifteen or twenty dollars, I guess—and then a Chicago trade paper wanted me to prepare a page of specimen ads which they syndicated.

"From then on, I was in advertising work. The one basic principle I have always used in ad work was given me by an old man of the game. I

once heard him say that most people write long letters because they haven't time to write short ones.

"It was with this idea in mind that I thought of writing snappy sentences of not more than twelve words which people could read as they passed in an automobile or car. In 1914 we started with ordinary white paper and black crayon. But wind and rain made this impractical. Then we had a sign painter paint the dope on muslin, but this was expensive. In 1917 we made the grinning schoolboy with his huge slate, and he seems to be taking all right."

A glimpse through the fun maker's scrapbook reveals the exceeding modesty of this statement, for there are letters from ministers, actors, politicians, governors and senators asking permission to quote his



Charles H. Archbold and His Schoolboy—Two Good Pals Who Are Helping Dealers in All Parts of the Country to Increase Sales.



The Facts Are All in Favor of NOKORODE

UTILITY:—

Nokorode will quickly, easily and permanently solder all metals but aluminum.

QUALITY:—

Nokorode is carefully compounded — contains no acid. Its quality never fluctuates.

EFFICIENCY:—

Nokorode works fast and effectively, and results are everlasting.

ECONOMY:—

Nokorode is ready for instant use. Spreads further and more uniformly than any other flux, and does away with all mixing—saves both flux and time.

SAFETY:—

Nokorode is harmless—if spilled on the operators' hands or clothing it will not burn—has no disagreeable fumes.

Every can sold under our guarantee of satisfaction, or we will refund direct the full resale price.

THESE FACTS HAVE MADE
NOKORODE PRODUCTS THE MOST
EXTENSIVELY USED SOLDERING
FLUX IN THE WORLD.

THE M. W. DUNTON CO.
670 Eddy St. Providence, R. I.



One Coil for Every Car

With one Master Coil, three bases, three adapters, two resistances and one condenser to start with you are in the same position to handle **every** car that comes to your door as the station with hundreds of dollars invested—and this complete outfit costs but \$7.95.

When you have equipped a car you pocket a real profit and refill your stock by ordering the parts you used.

No electrical knowledge is needed and there is no chance for error because with each service station outfit are photographic illustrations showing exactly how each installation is made and a list of the fittings that go on each car and model from 1912 to 1922.

With twenty-seven years' experience back of every unit, the J & B Master Coil will positively make **better** ignition on every car equipped. You can't go wrong because we sell it on a guarantee of your money back without question if for any reason you are not satisfied.

H. P. MANLY

Distributor

1010 S. Michigan Ave.

Chicago, Ill.

H. P. Manly,

1010 S. Michigan Ave., Chicago, Ill.

Ship by parcel post one J & B Service Station Outfit including one coil and fittings to make installation on any car. Enclosed find \$7.95—Make shipment C. O. D.

(Mark plan preferred)

Name

Address

Town

epigrams. There are clippings of world famous addresses which have been enlivened with the amusing sayings of the "schoolboy," and much more that testifies to the great success of this idea.

Somebody wanted to know one day if Archbold ever found it hard to think of new ones. "No," he replied, "I can keep going just as long as I can hold a pencil and have my eyes and ears."

"I live and think in epigrams," he adds, "I listen to girls on street cars. I go to dances just to look around and listen. I join clubs and get all the social life I can. I read much, especially popular magazines and books which the mass at large is reading, for my thoughts. I realize that the things that may make folks laugh will do so only as they are in tune with the thinking and doing of the times."

And it was the jazz music of the dance that inspired these:

"No one likes chin music."

"Jazz—delirium tremens made audible."

"A jazz quartette—a cowbell, a fog-horn, a buzz-saw and a dog fight."

It's easy to guess the inspiration for this one:

"Many a car is driven from the back seat."

What better greeting for the impatient motorist than this:

"Better wait a moment at the crossing than forever in a cemetery."

And all this is done by Archbold at home in the evenings! For, in his professional life, he is the advertising manager of The National Refining Co., of Cleveland, Ohio.

And it is for the benefit of dealers and service stations handling En-ar-co motor oils and White Rose gasoline that he devotes his ready wit to the preparation of this boy and slate epigram service which has proved to be a really remarkable aid in stimulating interest and increasing sales.

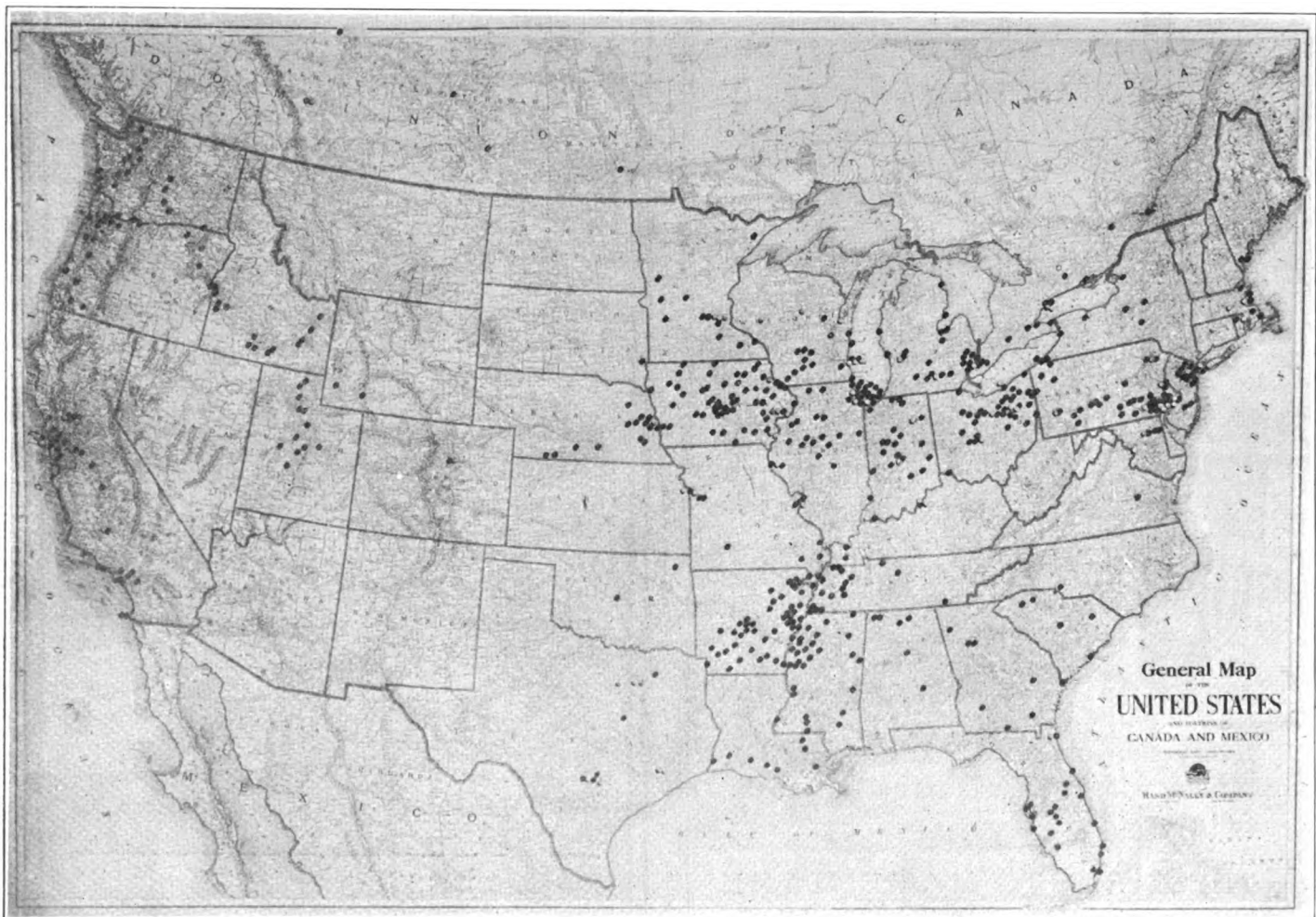
Paragraphs.

BENTON HOPKINS, formerly advertising manager of Denby Motor Truck Co., Detroit, Mich., and previous to that associated in an advertising capacity with other automotive manufacturers, has joined the H. L. Rackliff Co., the well known automotive marketing counselors of Cleveland and New York.

Mr. Hopkins will be associated with the Rackliff organization as advertising counselor.

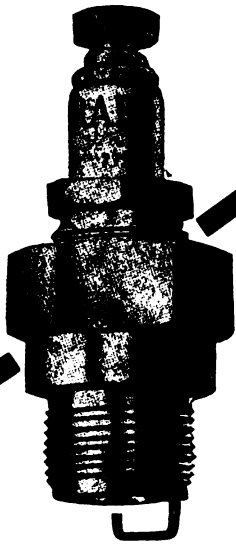
SHUNK MFG. CO., of Bucyrus, Ohio, manufacturer of Eureka springs and bumpers, has secured the H. L. Rackliff Co., automotive marketing counselors of Cleveland and New York, to supervise and assist in plans of distribution.

The Shunk Mfg. Co. is one of the oldest in the industry, and rapid strides are being made in enlarging its distribution to meet the demands of a rapidly growing business.



This is a pictorial story of the merchandising movement of the Automotive Equipment Association during the first year of its work. Each pin in the map on the wall of the office of Merchandising Director Ray W. Sherman, at 1818 City Hall Square Bldg., Chicago, means that a meeting was held, the Ask 'Em to Buy story told and, in most cases, the Ask 'Em to Buy moving picture shown to an audience of dealers. Sometimes but five were in the audience, once 1,700, several times there were 500, and the average is about 70. Fifty thousand people in the trade attended these meetings, of which there were 700, and hundreds of dealers through these meetings are making more money. Most of the meetings were held by jobbers in the territories served.

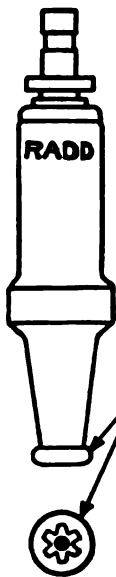
During the second year of the work the Ask 'Em to Buy moving picture story of Dan Morgan's rise to financial success will be supplemented by another picture which is entitled "Shop Profits." Dealers in any section who want to see these pictures may have them by asking the jobbing house with which they deal. Ask the salesman who calls on you. And don't forget to ask about the A. E. A. books: "A Greater Business," and "Shop Profits," which tell how dealers and garagemen may make more money. The idea behind the movement is well expressed in the title in one of the moving pictures: "Our industry can grow only as the dealer first makes profits."



RADD Spark Plugs must produce results. And they do. The Radd has an auxiliary electrode—an exclusive feature—generating a small spark in advance, thereby greatly aiding the discharge of the main gap. This makes possible a larger, hotter spark than is customary with the ordinary gap plug.

The Radd for Results

No more misfiring. Oil troubles disappear. Motor starts easier, runs smoother and cooler. Cylinders fire uniformly. And gasoline is saved. Dealers—you can't beat the Radd for your customers—it's perfect. Use the coupon and secure all the details.



RADD
The
**SPARK
PLUG**
with the
CAP

**LEICH
ELECTRIC
COMPANY**

Genoa Illinois

Leich Electric Co.,
Genoa, Ill.

Kindly send complete information and trade prices on Radd Spark Plugs.

Name.....

Address.....

HAVE THEM REBABBITTED

Dealers, garages and repair shops familiar with our rebabbitting service have stopped throwing away connecting rods and bronze back bearings when the babbitt lining gives out. They have collected all such parts around their repair shops—had them rebabbitted and are now making an additional profit on replacements.

CONNECTING RODS



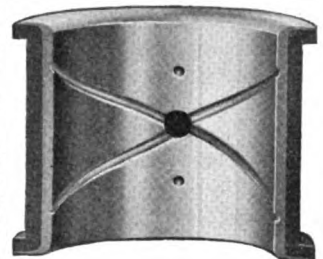
We specialize on rods using a bearing cast in the rod and recommend the same process on rods which use insert bearings if you have trouble with inserts working loose and beating out.

We tin in a bearing of S. A. E. specification babbitt, broached to crankshaft size, duplicate original oil holes and grooves.

Also furnish new bolts, nuts, laminated shims and bronze bushings in many popular car rods using a poured-in-rod bearing.

CRANKSHAFT BEARINGS

Bronze back crankshaft and connecting rod bearings can also be rebabbitted. It is often difficult to find new bearings, especially for "orphan" cars. You save time and money sending yours to us to be refilled. We machine bronze back bearings to special sizes for re-ground crankshafts when caliber dimensions of throws and mains are furnished.



Send Parts to Factory Nearest You for Quickest Service.

WATKINS MFG. COMPANY

203 North Waco St.

Wichita, Kansas

INDIANA WATKINS MFG. CO.

21 West South St.

Indianapolis, Ind.

ALL-STATES REBABBITTING SERVICE

3 Main Street, Waterloo, Iowa

WATKINS MFG. COMPANY

203 Wyoming Street

Syracuse, New York

SERVICE ON ANY CAR TRUCK TRACTOR

R. S. Mitten Appointed Chicago Manager for Black & Decker.

W. C. Allen, who has been in charge of the Chicago branch of the Black & Decker Mfg. Co. for the past year, has been appointed sales supervisor for this company.

In order to release Mr. Allen for his



R. S. Mitten Will be "Among Friends" as Chicago Sales Manager for Black & Decker.

new work, R. S. Mitten has been appointed branch manager for the Black & Decker Chicago territory.

Mr. Mitten was formerly sales manager of the Electric Appliance Co., Chicago, and will be "among friends" in his new capacity.

The territory which is to be in Mr. Mitten's charge consists of the states of Illinois, Iowa, Wisconsin, Minnesota, North Dakota, the eastern half of Missouri, including St. Louis, a small corner of Indiana, taking in South Bend, and the western end of Michigan.

Western Tourists Will Like Hobbs Grade and Surface Guide.

For the motorist planning a trip to Denver, or points intermediate between Chicago and Denver, the Hobbs Grade and Surface Guide which is being issued by The Mohawk Rubber Co., of Akron, Ohio, offers a fund of valuable and helpful information.

The booklet presents detailed descriptions of road conformations and road surface conditions, charted by mile sections, and even shows where chains are needed in wet weather. It names some of the reliable garages along the route which maintain machine shops, day and night service, tow-car service, battery service or any of these services, giving the telephone number and current labor rate for each.

Hotels and restaurants—luxurious, moderate or simple as to conveniences and rates—are listed, together with prices.

Gas and oil stations between towns are plainly marked.

Tourist campgrounds en route are indicated and the facilities afforded by each—such as water, light, stoves, police protection, etc.—are enumerated.

The Hobbs Grade and Surface Guide, Lincoln Highway-Cheyenne and Denver to Chicago section, contains all this data in addition to the usual road guide service. It offers a good suggestion to the garage and service station desiring to give special service to its tourist patrons, and is sold at an attractive price.

Write the Mohawk Rubber Co., Akron, Ohio, for special prices on orders in quantity lots of these guides.

Do You Like Good News? Read the Wicaco Message.

Wicaco means just two things—in the language of the American Indian, "a pleasant place" and, in the language of good merchandise, "a pleasant product."

"The kind of good products we make here," says Wicaco Screw & Machine Works, Inc., "must measure up to our 'pleasant plant' and to our 'pleasant customers' with whom we maintain 'pleasant relations'."

Wicaco Screw & Machine Works, Inc., was established in 1868, and began to make the Twin-Cut piston ring just about one year ago. R. I. Erlichman is the inventor of this ring, formerly known as the "lightning cut," which is the only piston ring with a wandering oil groove, the oil groove being its most salient feature. These rings are made from individual castings of close-grained gray iron, are concentric in construction and are machined to micrometrical correctness.

The package is especially featured as "Wicaco pack, six rings to the box," the receptacle itself being similar to a telescope in construction and attractively labeled. This method of packing eliminates the possibilities of broken stock either on the dealer's shelf or in the storeroom.

Wicaco Twin-Cut rings are made in all popular sizes and oversizes.

Further details concerning the Wicaco can be obtained upon request from Wicaco Screw & Machine Works, Inc., Stenton Ave. and Loudon St., Philadelphia, Pa.

BOOK REVIEW.

MODERN SCIENCE IN THE GARAGE BUSINESS, by Sidney Osser. Published by Automotive Publishers, Columbus, Ohio. 91 pages, 5 ins. by 7 ins.; price \$1.

Written by a man who has had seventeen years' theoretical and practical experience in the various branches of the automotive industry, this publication, which is in a convenient pamphlet form, offers a large number of valuable and constructive suggestions to the garageman and service station operator.

As an inventor, Mr. Osser is of considerable repute, having successfully produced a number of inventions and automotive improvements.

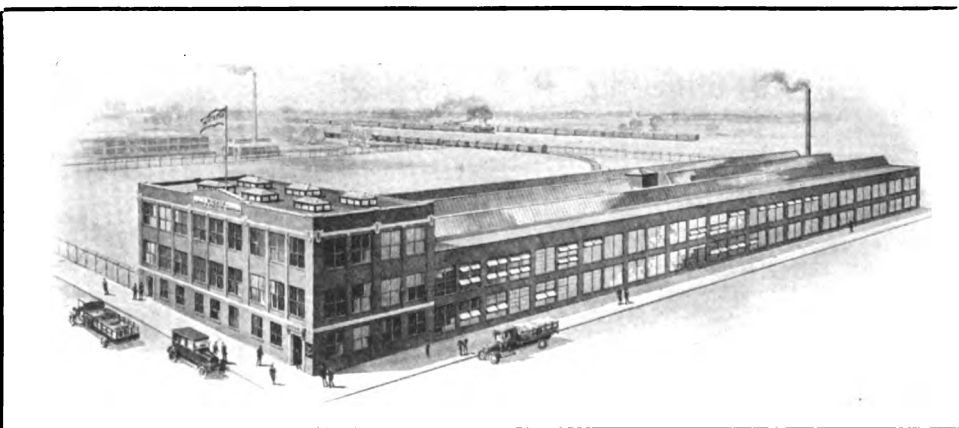
It is this writer's belief that the great need in the garage business today is that it be placed upon a scientific basis.

Some of the chapter titles which give a good idea of the book are:

What Ails the Garage Business; The Window and Its Advertising Value; Accessories that Sell; Used Cars Are Profitable; New Cars; Elementary Electricity, the Storage Battery and Charging; Oxy-Acetylene Welding and Carbon Burning; Service: Including Oil, Gas, Water and Air; Your Stock Room; Your Show Room; Your Repairshop and Time Saving Devices; Road Signs and Advertising Suggestions; Office Methods and Legal Protection; The Future of the Scientific Garage.

It is really surprising how many practical and timely suggestions this author has been able to include in this small volume, which can readily be carried in your pocket and referred to in those odd moments that the busy garageman occasionally finds between jobs.

Orders for the pamphlet should be mailed to Automotive Publishers, P. O. Box 955, Columbus, Ohio.



"Wicaco" Means "A Pleasant Place," and So Exactly Suits Plant of Wicaco Screw & Machine Works.

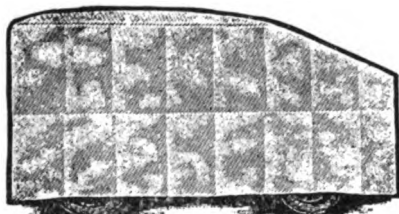
Kennedy Auto Covers

**Keep the Cars
Shining and
"Tickle" the Trade**

These auto storage covers—of strong, heavy paper, slip over the cars and keep them clean for days, for weeks, for months. In five standard sizes—fit any car. And you can sell them to customers who keep their cars in their own garages. Good profits all the way 'round. Send for literature—it's worth while.

**THE KENNEDY CAR LINER
AND BAG COMPANY**

Shelbyville, Ind.
Canadian Factory
Woodstock, Ont.



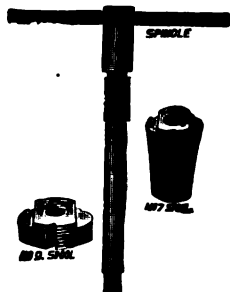
"It Always Does"

No matter in how difficult a place a bushing may be or how tight it is

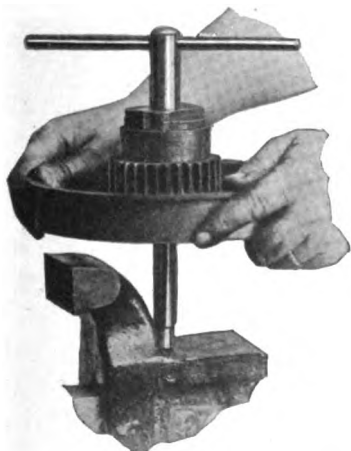
The Holly Bushing Extractor

always gets it out! Extracts sizes ranging from $\frac{3}{8}$ " to $2 \frac{5}{16}$ ".

Used and recommended by leading motor manufacturers. Tools to be had singly or in sets.



No. 79. Extracts bushings— $1 \frac{7}{16}$ to $2 \frac{5}{16}$ inclusive.

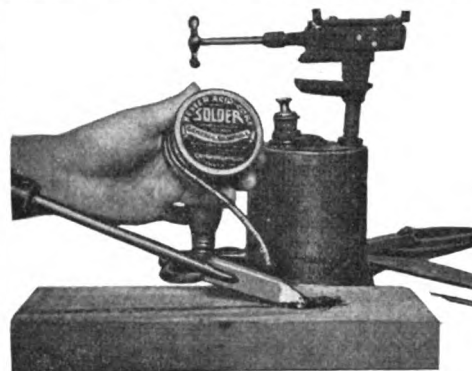


No. 79 extracting Ford Transmission Reverse Drum Bushing.

Standard set (Nos. 0, 1, 2, 3, 4 and 34B tools) \$18.40
Combination set (No. 579 tool extracts bushings from $1 \frac{1}{16}$ to $2 \frac{5}{16}$ " inclusive) \$10.00
Special Ford Set (Nos. 1, 2, 3, 4 and 79 tools, extracts all bushings in Ford cars and trucks) \$20.00

If your jobber cannot supply you, order direct from

The Rosier-Howard Corporation
307 National
Hutchinson,
Kansas



Acid Core Solder Easily Tins Irons

and acid core solder means Kester, of course.

Just heat the iron good and hot, brush off all scale and soot, and dip quickly in a solution of sal ammoniac. Then apply Kester Acid-Core Wire Solder to the soldering surface, spreading it over this surface with a steel brush. Simple—speedy—easy. In fact, there's no other solder that works so easily. And what a well-tinned iron is the result!

The little coupon below is for you. Send it in, and the testing sample it will bring you, will please you mightily.

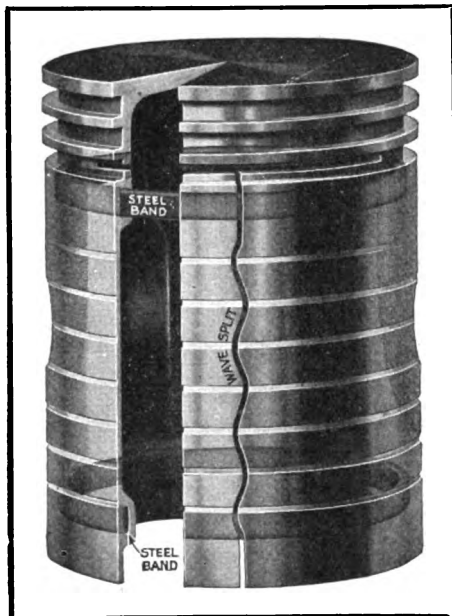
CHICAGO SOLDER CO.
4210 Wrightwood Ave.
Chicago, Ill.

CHICAGO SOLDER CO.,
4210 Wrightwood Ave., Chicago, Ill. Am. Garage 9-22
Gentlemen: Please send me a free sample of Kester
Acid-Core Wire Solder.
Company
Address
City
State
Our Supply House Is.....

Accessories—Dealers' Key to Profits

Butler Mfg. Co. Develops a New Type of Piston.

A new type of Bu-Nite steel band piston has been developed recently which, it is said, does that which the engineers have said they would like to have a piston do,



New Type Bu-Nite Piston Has Less Degree of Expansion Than Cylinders.

but which had been considered impossible on account of the expansion of a light weight alloy metal.

The demand for a piston made of a metal which is light in weight and yet possesses bearing efficiency and strength, is rigid in construction and may be lifted to cylinders allowing no more clearance than is required by an iron piston, is being supplied.

Bu-Nite steel band pistons can be installed, allowing less clearance than the iron piston required, with perfect safety.

The most valuable feature is that the piston has a less degree of expansion than the cylinders; consequently, the cylinders of a hot engine are expanded to a greater diameter. The piston expanding at a less degree allows more space between cylinder and piston for lubrication, which is the desired condition in a heated engine.

This specially designed Bu-Nite steel band piston is thermostatically controlled and it is very rigid in construction, due to the fact that two solid steel bands, particularly designed to properly function and of a smaller diameter than the piston, are cast within the skirt, which is the feature controlling the expansion.

The material used in the new Bu-Nite piston reduces the weight to less than one-half that of a substantial iron piston and is very tough, having a bearing efficiency

equal to that of bronze. This metal also has high conductive properties, which is a decided advantage in dissipating the combustion heat.

Results from actual road tests are declared to be ideal, having the advantages of a light-weight piston built from a non-scoring material of great bearing efficiency which, it is stated, insures much less wear on the cylinders, also prolongs the life of the connecting rod and crankshaft bearings, and increases the efficiency of an engine.

The Butler Mfg. Co., 3234 W. Washington St., Indianapolis, Ind., the company manufacturing this product, has spent a large amount of time making tests and subjecting the new piston to all imaginable tasks under adverse conditions before placing it upon the market, and they say the best part of it all is that the new piston will do what they claim it will do in a demonstration and then keep on doing it.

Further information concerning the new Bu-Nite piston can be had upon request from the manufacturer at address given.

A "Sure Fire" Salesman Offers Services Free to Lyon Dealers.

One of the most attractive window displays seen recently is that which is being placed at the disposal of dealers handling Lyon bumpers by the Metal Stamping Co., of Long Island City, N. Y.

The illustration gives only an inadequate idea of the effectiveness of this display which—more eloquently than any words could do—tells the car drivers who pass your windows the reason why they should equip their cars with bumpers in winter as well as summer. Its appeal is insistent—in fact, it is a real salesman whose ability to increase fall and winter sales of bumpers should interest every progressive dealer.

The lithographs used in the display are furnished free to all Lyon bumper dealers. Write the Metal Stamping Co., Long Island City, N. Y., for full particulars.

"Con-O-Co" Oils Designed to Meet Exacting Lubrication Demands.

The proper lubrication of gasoline and kerosene motors has, during the 20 years such motors have been in common use, offered a problem which involves constantly changing factors.

"Con-O-Co" process motor oils are designed to meet the unusually exacting requirements of the present-day motors and fuels, and are the result of months of laboratory experiments, practical refinery processes and actual use on various types of motors, automobiles, trucks and tractors.

Twenty years ago, all gasoline cars and most internal explosion engines used nothing except 76-degree gasoline with about 300-degree end point, straight run from crude oil and all carefully treated in the agitators to remove the last vestige of tarry matter.

This has gradually changed, and we now have kerosene and distillate engines of various sorts while automobile and truck engines are generally operated with heavy, untreated gasolines blended with light natural gas gasolines, producing a product of under 60-degrees gravity and approximating 450 degrees end point. Frequently this end point exceeds 470 degrees and sometimes runs over 500 degrees, as shown by the reports of the U. S. Bureau of Mines.

Lubrication systems have also changed greatly and, with the changed fuel conditions, have revolutionized lubricating requirements.

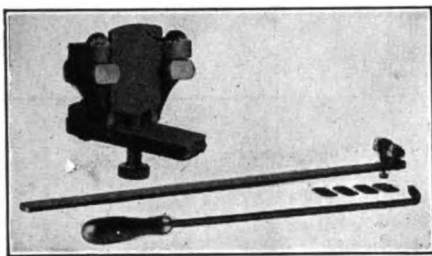
Because of these conditions, and in a



Lithographs Used in This Display Furnished Free to All Lyon Dealers.

BIG PROFITS IN REPAIRING SCORED CYLINDERS

No secret or mystery with the TORIT process



TORIT SCORED CYLINDER TOOLS

(Adjustable blade holder magnified)

TORIT tools refinish the cylinder to the same bore and surface. No new pistons, no regrinding. Easy work, big pay. Get your outfit now.

Price of tools, as shown, with instructions.....\$10.00
Filling-in metal, per pound..... 3.50

ST. PAUL WELDING & MFG. CO. 165 W. 3rd St., St. Paul, Minn.

Mrs. TORIT torches, generators, preheaters, etc.
Distributors REGO oxy-acetylene equipment.

DO ALL YOUR OWN PRESSING and PULLING

The only combination garage and auto tool on the market that quickly and easily straightens axles, presses and pulls clutches, wheels, gears, bushings, or any of the other thousand and one pressing and pulling jobs around a repair or machine shop.

Consisting of 20 pieces of forged and case hardened steel, The Universal Garage Tool is made to withstand the most severe usage and hard work. This simple, powerful, compact combination tool more than pays for itself in one overhauling.

UNIVERSAL GARAGE TOOL
COMPLETE WITH TOOL BOX

| | |
|--------------------------|--------------------------|
| Light Weight Set \$12.00 | Heavy Weight Set \$15.00 |
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Dealers: Write for our proposition and territory

THE UNIGARTO CO.

309 South Cornell Fort Wayne, Indiana

The

Sterling

PORTABLE RECTIFIER



against overcharging. Dash connection, if desired. Simply insert plug in dash to charge.

Initial charging rate 6-volt battery, either 5 or 10-amperes.
Price complete\$16.00
West of Rocky Mountains \$17.00

OTHER STERLING PRODUCTS—
Dash and Pocket Ammeters and Voltmeters,
High Rate Cell Tester, Magneto-Meter,
Polarity Indicators and Spring Oilers.

Ask your jobber or write direct for Bulletins

THE STERLING MFG. CO.

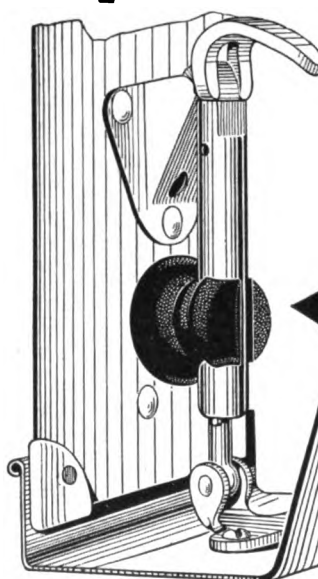
2849 Prospect Ave.

Cleveland, Ohio

Over 2½ Million Sterling Instruments in use today

Domes of Silence

---a gripping story



Made in one piece of rubber which weighs but one ounce, the JORGENSEN HOOD SILENCER has the strength of a giant when applied to the fastener of an auto hood. All hood rattles are quickly and permanently eliminated.

Just a few months ago only a model of this new accessory was in existence—now 100,000 of them are taking the rattles out of 25,000 auto hoods, used on the Dodge, Chalmers, Buick and other cars.

Dealers: Order now for the fall trade.

Jorgensen Auto Silencer Co.
Hamton Road, Erie, Pa.

vain endeavor to meet them, the last few years have seen a greatly increased demand for heavy motor oils, in order to better withstand the hotter cylinders, to seal the rings more perfectly and to resist to a greater degree the loss of lubricating value due to "dilution."

For many months, the Consumers Oil Co., of Chicago, has utilized its years of experience, together with the skill of expert analytical chemists in fats and oils, to produce the "ideal" oil, and the result of this labor is the present line of "Con-O-Co" process motor oils which, as the name indicates, are of special process.

They are thin oils at ordinary temperatures, remain fluid at low temperatures, and are comparatively thicker oils at high temperatures, having, it is said, viscosities at far beyond any stearite petroleum oil which can be refined for motor lubrication.

"Con-O-Co" process oils are high-grade, pure Pennsylvania lubricants. They are said to be a real new departure in the lubrication of internal explosion engines.

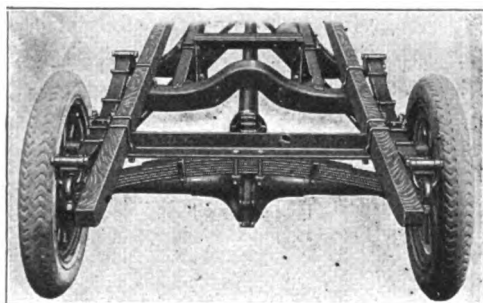
The manufacturer states that only high-grade crude oil has ever been refined in their refineries. This, together with efficient refining methods developed during years of experience, insures an exceptionally high grade of petroleum products.

The crude oil is not acid treated or steam stilled before it is refined, and the only products chemically bleached or acid treated are kerosene and gasolene. The buyer of "Con-O-Co" products is, it is declared, absolutely assured of receiving products that are entirely bland and neutral, with the maximum of lubricating value.

Write the Consumers Oil Co., 225 No. Michigan Ave., Chicago, for particulars regarding the very attractive proposition being made to dealers.

Ryd-E-Z Springs Mean More Mileage for Ford Trucks.

Shocks, jars and vibrations are sure to result in a decreased tire mileage and in-



View From the Rear of a Set of Ryd-E-Z Springs.

creased wear and tear on the engine and body of the truck.

Realizing this, the Ryd-E-Z Spring Co., of Cleves, Hamilton Co., Ohio, has designed and perfected the Ryd-E-Z springs

for the Ford ton truck, for which the following advantages are guaranteed by the manufacturer:

That they will increase tire mileage; reduce all repairs; carry all farm products and fragile merchandise without damage; give the driver greater comfort; improve the appearance of the truck; and save money for the truck owner.

Ford springs are made in two sections—each 18 inches long, or a total of 36 inches. Ryd-E-Z springs are a platform spring suspension similar to that used on the high-priced passenger cars. They consist of 3 springs, each 42 inches long suspended on patented supports on each side and across the rear, giving 7½ feet additional resiliency over the original Ford springs.

The front and rear spring hangers distribute the load 21½ inches forward and backward from the differential, thereby decreasing the wear and tear on that member.

The front spring hanger also strengthens the chassis and prevents buckling or twisting.

The rear hanger supports the body rails and takes care of the load that overhangs the chassis, reducing the bent and broken body rails to a minimum.

The construction of the Ryd-E-Z springs is based upon the theory that, when short, heavy springs are replaced by long, well-shaped springs, there will be a vast difference in the way the truck rides.

Therefore, it is declared, Ryd-E-Z springs will stop shocks, jars and vibrations and give the truck longer life and a lower operation cost.

Further, these springs are very easy to install, as there are no holes to drill and it is a bolting job only.

"Sell Fast Because So Convenient," Says Dealer of Stewart Carriers.

Dealer Everready was one of those observant chaps who find opportunities for business where slower thinking men never even trouble to look.

"They all need something," he was wont to say, "and if I am the first to see the lack and suggest it to them, why it generally means a sale for me."

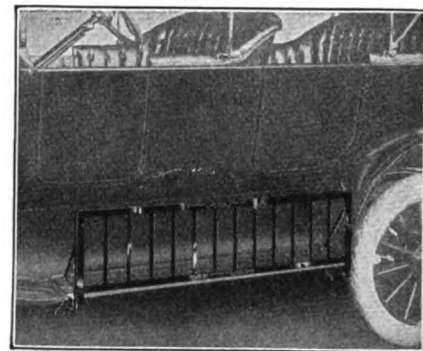
One warm July day, as he prepared to leave his shop for lunch, he paused for a moment in the shop's doorway. As usual there were some three or four cars lined up along the curb and, also as usual, his keen eyes looked them over for possible equipment needs.

He noticed one car in particular, in which there appeared to be a considerable amount of luggage of a nature suggesting that the owner contemplated somewhat extensive travel.

"Looks like old Gillman's car," surmised the dealer. "Wonder where he's bound for? Here comes the old boy now. Guess I'll see what the chances are for making a sale or two."

"Hello, Gillman," he called, as the other man drew near. "Looks like you might be off for a long jaunt. Isn't there something in my line you can use?"

"Well," answered Gillman, "there might be an inch of space unoccupied in that



Stewart Carrier Affords Ample Carrying Space on Running Board.

car where you could stow something else we don't need—but you'll need a microscope to find it!"

Everready laughed. Here was his opportunity and he was prompt to seize upon it.

"You do look a bit crowded," he admitted. "But that's just where I can help you. Why stow all that luggage there where it's in everybody's way, when it can easily be taken care of so that you can all be comfortable?"

"I'd like to know how," retorted Gillman.

"Let me show you," promised Everready.

Going into his shop again he brought out a Stewart luggage carrier, and proceeded to attach it to the running board of Gillman's car. He showed him how easily his luggage could be held by the carrier, which afforded ample carrying space on the running board, pointed out its strength and durability and the fact that there would be absolutely no rattles or squeaks from it.

"It looks good," admitted Gillman "and I think it would be handy for taking care of luggage, but I don't much like the idea of having it on the car when I am not carrying luggage."

"That's one of the best points about the Stewart luggage carrier," said Everready. "See these two springs at each end? When you don't want to use it, all you have to do is to release these springs where the carrier is fastened to the running board and slam it underneath the running board where it is held securely until you want it. Release this spring catch and you can raise it to position on top the running board again."

And another Stewart carrier was quickly sold. "They are so convenient, they're quick sellers," says Dealer Everready.

Stewart luggage carriers are made for all makes of cars. No extra bolts or nuts or drilling of additional holes are needed to fit it to Ford cars. On other makes of course, it is necessary only to drill four

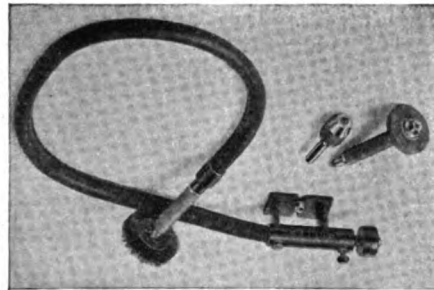
Every Tire Dealer Using AMERICAN GARAGE & AUTO DEALER

Should get on our mailing list

Write or wire
for our latest
Bulletin just
off the press

It is a real Money Saver
and will be sent
upon request to
those in the trade

BROADWAY TIRE JOBBERS, Inc.
250 W. 54th Street, New York City



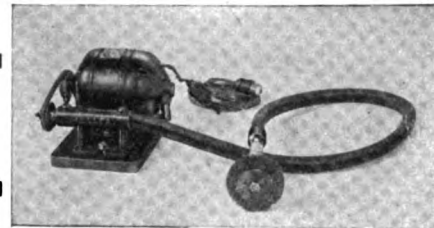
There's No Argument About
The Muller Flexible Shaft
Buffer Grinder Outfit.

Garagemen universally agree that it's "just right" for buffing any size tire—and for grinding and drilling. Saves 75% on horsepower over old style buffer stand. Extra heavy in design. Bench outfit readily attached to regular motive equipment, or motor furnished. The Muller, in short, assures stronger repairs and greatly increased profits with less labor.

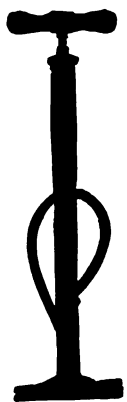
Saves 50% of the Workman's Pep.

Send for data

MULLER FLEXIBLE SHAFT CO.
77 West Seventh St. ST. PAUL, MINN.



AUTOQUIP PUMPS



No. 31. Peerless Steel Barrel Anchored into base by Patented Process. Quick acting air chuck, heavy tubing, reinforced base with special ground grip flanges.

PROFIT Plus ECONOMY

There is profit for the dealer in selling one line of pumps—if within that scope he has A SIZE — A STYLE — A PRICE to satisfy every customer. There is also economy, for his turnover is naturally big.

AUTOQUIP Pumps are so recognized.

Write today for prices and discounts. Giving name of your Jobber.



No. 21 Paramount. High grade single acting pump. LOX-on Jr. Air Chuck. Brass Tube and Brass Check Valve. Heavy Reinforced Base, length 21" over all. A LIFE LONG PUMP.

Autoquip Mfg Co. Inc.
ROCHESTER, N. Y.
MANUFACTURERS OF

LOCKTYPE ANTI-RATTLERS

BLACK AND WHITE Valve Grinding Compound!

Black & White CUTS!

It's the fastest-cutting, smoothest-working GOOD valve-grinding compound you have ever used.

LIGHT PRESSURE, MIGHTY QUICK CUT

Finishes valve seats in half the time—smooth as silk—and never leaves a ridge.

DISTRIBUTORS

Some Desirable Territory Still Open

Abrasives Sales Corp.

17 East 49th Street

New York, N. Y.

Factory, Mt. Vernon, N. Y.

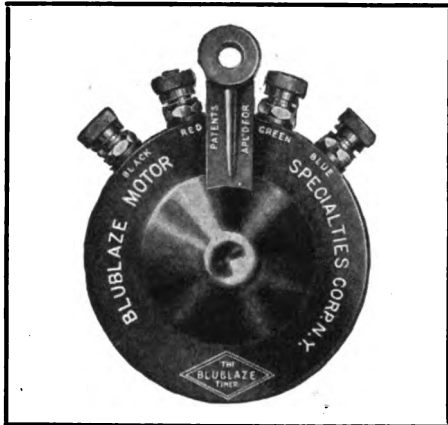
BLACK & WHITE
VALVE GRINDING COMPOUND

holes for 5/16-inch bolts. Only a few minutes are required to attach it.

Further details can be had upon request from the Stewart Iron Works Co., Inc., Cincinnati, Ohio.

Clean, Snappy Action Assured the Blublaze Equipped Ford.

The Blublaze timer has several unique features. It is molded of condensite, which is one of the world's best known insulators. The terminals are all at the top, which enables the motorist to check up the



Blublaze Timer Molded of Condensite.

connections at a glance without removing the timer.

These overhead terminals also keep the wires from becoming grease and oil soaked. In addition, they are numbered to correspond to the cylinder to which connection belongs, and are labeled "green," "red," etc., to agree with the color of the timer wires.

Contact is made through a special composition brush made of copper, carbon and graphite which is wiped with even pressure over the highly polished raceway in the timer shell. The composition of the brush is designed to eliminate pitting and also to do away with the necessity of lubricating the timer. The brush gives thousands of miles of service, and is quickly replaceable at trifling cost.

Recent improvements incorporated in this device—including a new form of trackway and a new design of contact segment of a special material—make this device even more efficient than in the past, giving easy starting and positive firing at all speeds, it is stated.

Write Blublaze Motor Specialties Corp., 43 Seventh Ave., Long Island City, N. Y., for further details.

You Sell Your Customers Protection with Motoright Locks.

The wise motorist considers the expense required to equip his car with a suitable lock in the light of an investment.

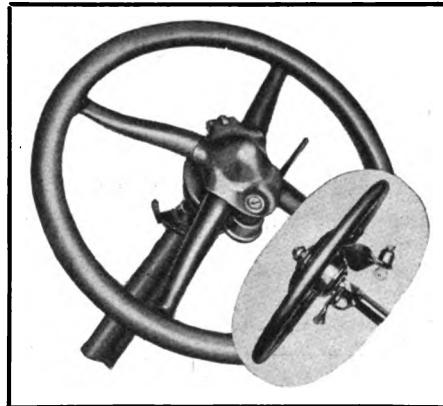
Your Ford owner customers, therefore, will be appreciative of the good features which have been incorporated in the lock now being marketed by the Packard Engi-

neering Co., under the name "Motoright."

Foremost among the advantages attributed to it are: That it grips and protects the upper steering mechanism and all four spokes of the wheel in a jacket of armored steel; that it is free from delicate pins and dainty plungers and can not be drilled, cut or forced; that it is applied without drilling holes and without interfering with or altering the standard Ford steering parts; that, while the Motoright is in no sense a "cheap" lock from the standpoint of design and construction, the price at which it is offered is most attractive.

Further, the Motoright lock has been tested and approved under the latest rulings of the Underwriters' Laboratories, and it is said to give the car owner a 15 per cent reduction on the amount of his insurance premium.

The Motoright lock is made with the new gun metal finish, to harmonize with the standard Ford steering wheel. It can be had in nickel finish, also, if preferred for use with a special wheel. The material used in its construction is tough steel



"Motoright" Lock Grips and Protects Upper Steering Mechanism.

throughout, with a glass hard surface that resists filing or cutting. No castings.

There is no chance of leaving the Motoright unlocked by mistake, as anyone can tell at a glance whether it is locked or unlocked.

A Motoright lock is easily installed, the only tools needed being a wrench to remove the steering wheel nut and a hammer to drive the locking pin. It can be installed in about five minutes' time. The lock is readily removed when unlocked because the locking pin is exposed. When locked, the locking pin is covered. There is no vibration or rattle with a Motoright.

There is no need to fumble around for a key when a Motoright lock is used, as the locking cylinder is on top, right in front of the driver.

Dealers and others interested should write the Packard Engineering Co., 1200 West 76th St., Cleveland, Ohio, for full particulars concerning prices, etc.

Winter Starting Easy for Ford With Aske Electric Fuelizer.

The Kase Electric Co., of Duluth, Minn., which for the past year and a half has been successfully marketing the Aske electric vaporizer for all makes of cars has now developed an electric fuelizer designed especially for the Ford motor.

The Aske electric fuelizer for Fords consists of a cast-iron manifold, with a chamber formed in the gas passage for the reception of the heating element, which is shown in the illustration. The Aske electric fuelizer is designed to overcome motor starting troubles by electrically pre-heating the gasoline to so perfect a vapor that the weakest spark will instantly start the motor, thus eliminating crankcase oil dilution and drain on the battery.

The time required for starting is about five seconds. The device is practically instantaneous in its action, requiring but five seconds to start a cold engine in below zero weather.

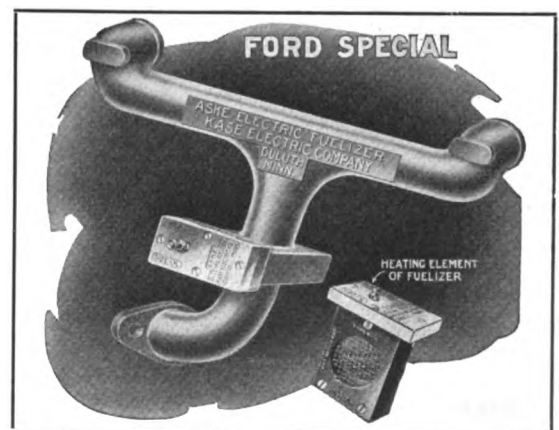
In addition to giving instant engine starting, it is declared that the Aske electric fuelizer has equal value in giving increased mileage per gallon of gasoline. This is brought about by the breaking-up effect of the fuelizer grids on the gasoline spray, which acts like a mixing chamber in re-atomizing the gasoline.

The manufacturer positively guarantees 25 per cent increase in mileage, regardless of make of carburetor. This fuelizer has been approved by the Underwriters' Laboratories, Inc., and has been recommended by them to the Automobile Council for listing the device as a standard automobile part.

The Aske electric fuelizer has come upon the market at an opportune time, as motor drivers have long felt the need of such a positive starting device to eliminate starting trouble. The device is very neatly constructed, easily installed and guaranteed for one year.

Special makes of fuelizers will be made for other cars in the near future, including the Dodge and Willys-Knight.

Write the Kase Electric Co., at Duluth, Minn., for further details concerning prices, terms that are being made to dealers, etc.



Electric Fuelizer Especially for Ford Engine.

Battery Repair Men! Automotive Electrical Stations!

Suppose a specialist were to enter your shop and help you select instantly the right battery, magneto or ignition part necessary to handle every job;

—and he also showed you the most economical way to buy Battery and Electrical testing and repair equipment: the kind that insures quick and skillful results;

—and his wealth of information included every tool and Replacement part that finds its way into a modern battery or electrical service station like yours;

—would you like to have his services—FREE?

Our new 138 page catalog is just such an expert—a helper that points a finger to the exact solution of every equipment or parts problem.

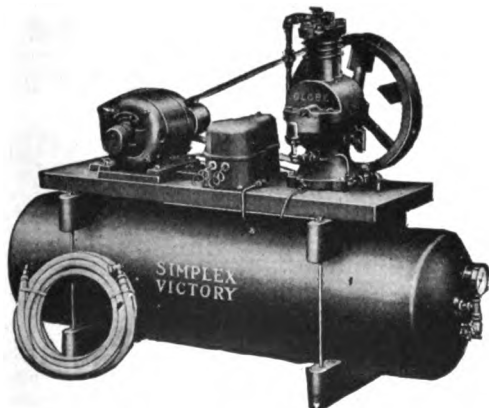
A copy will be forwarded on request, FREE—WRITE NOW!

W. F. PRICE BATTERY SUPPLY CO., Inc.
3300 N. Broad Street. Philadelphia, Penna.

THERE HE GOES

Another good customer lost because the old compressor has fallen down on the job just when he wanted his tires filled.

WELL, YOU DON'T HAVE TO LET HIM GO.
Hold your old customers and make new ones with a dependable air supply—



GLOBE SIMPLEX TWO-STAGE COMPRESSOR

Guaranteed to Pump more air for the amount of current consumed than any other type of compressor on the market. High in efficiency—Low in operating cost—Simple in construction—Reasonable in price and on the job all the time.

DON'T WAIT. BUY NOW AND LET THE SIMPLEX END YOUR AIR TROUBLES.

GLOBE MANUFACTURING CO.
Battle Creek, Mich.



Will sell itself when shown to your customer—the accessory that makes driving a pleasure. It is the heart beat and pulse of the engine—the only radiator cap condenser on the market. Dealers report ready sales and quick turnovers.

It condenses the vapors back into water; thereby keeping the water supply constant; assuring engine efficiency. At the first sign of an overheated engine the SENTREE warns you audibly and visibly.

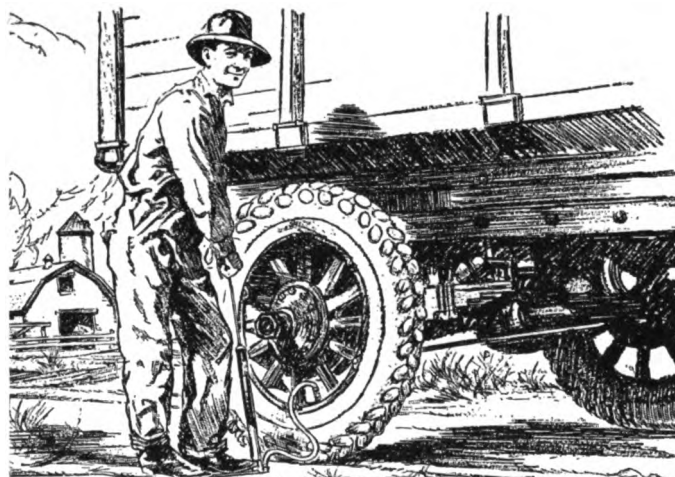
Sensitive, yet sturdy in construction, the SENTREE is always in perfect working order. Keeps engine cool in summer and warm in winter. It is a marvel of automotive engineering.

SENTREES will move out of stock as fast as you can unpack shipments. Get the full details of our liberal dealers' territorial offer.

ALERT ALARM COMPANY

609 N. La Salle St.

Chicago, Illinois



For Big Truck Tires

Never sell a weak tire pump to a truck owner—nor a hard working pump. Sell him a Rose. Sooner or later he will have troubles—miles from free air and no spare ready. Then he will thank you for selling him the easiest working pump made. Truck tires are a severe test—but the Rose makes easy work of them.

FRANK ROSE MFG. CO., HASTINGS, NEBR.

ROSE TIRE PUMP

"Guard Duty" by a Sentree Means Better Engine Service.

A sentinel on duty is ever watchful, ever alert—sleepless and vigilant, he permits not the slightest movement or sound to escape his notice. Should any suggestion of approaching trouble develop, he is quick to give the alarm.

That's why the Alert Alarm Co. has given the name "Sentree" to the remarkably efficient device which it is now offering to the motoring public.

The best of automobile engines is likely to go wrong once in a while, and it is the purpose of the Sentree to warn the motorist promptly, visibly and audibly of approaching engine trouble.

At the first evidence of an overheated condition, the Sentree instantly flags a warning by raising its cap about half an inch and exposing a red signal. But it doesn't just stop at that—if for any reason the signal is neglected or overlooked and the overheating continues, the Sentree blows a shrill whistle and keeps on complaining as long as the high engine temperature exists. Its voice is plainly heard, even in a closed car.

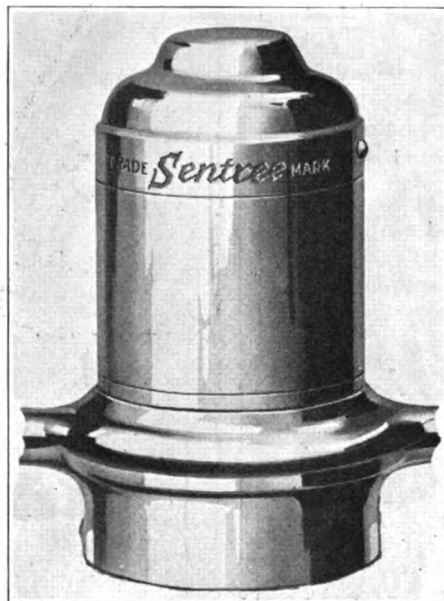
The illustration shows quite clearly the operation of the Sentree. The vapors arising from the water cooling system pass through the ports at *A* and circulate in the chamber *B*, where they are cooled by contact with the outer surface which, in turn, is kept cool by the rush of air created by the car in motion. The cooling of the vapors causes them to return to the liquid state and this liquid runs back into the cooling system.

Should there be engine trouble causing overheating, the increased pressure will raise the piston *C*, which is extremely sensitive, and will consequently raise the cap and expose the red surface *D*. More

heat and more pressure will send the piston a little higher, and the compressed air or vapors will rush through the opening *E* and blow the whistle *F*.

In case the water in the radiator boils for any length of time, the piston will raise a little higher and the steam will escape through the opening *G*.

The motorist who has a Sentree "on



Showing the Position of Sentree When "All Is Well."

guard" doesn't have to worry about whether there is enough water in his car's radiator—he *knows*. He knows, too, that he need feel no concern, even on the darkest or stormiest night, for the Sentree will not fail to give him warning of dangerous overheating before damage is done to the engine.

Simplicity and firmness of construction are likewise important features to be noted in the Sentree. There is no wiring or complex thermostat to install and no necessity for punching holes in the hood or instrument board or filament to be destroyed. It is an individual unit complete, and comes in only one model which fits any car.

Your customers will appreciate the additional mileage, freedom from expensive repair bills, and elimination of numerous engine troubles which the installation of this safety device promises.

Further details may be had upon request from the Alert Alarm Co., 609 N. La Salle St., Chicago.

A Life-Saving Device for Closed Cars in Rain, Fog or Snow.

In the past, car drivers have found automobiling in rain, fog, snow or dust, difficult and even dangerous because of the windshield becoming befogged and wet and preventing a clear view ahead.

When looking over the claims settled by some of the largest and best known casualty insurance companies, the inventor of the widely-known dictagraph was as-

tounded at the accidents caused by drivers attempting to "get by" with a clouded windshield.

As a result of this investigation, which was entered into largely as a matter of curiosity, the Clearview windshield cleaner was invented. This device is designed to clean with one stroke both the upper and lower glasses of the windshield.

The Yale Corp., of Los Angeles, Cal., will gladly forward full details to those interested upon request.

More Than Five Million Piston Rings in Two Months.

The fact that The Piston Ring Co., of Muskegon, Mich., has only been going after replacement business for less than a year attaches special significance to the recent production record of 5,232,051 Quality piston rings during two consecutive working months.

Although the plant of The Piston Ring Co. is said to be the largest exclusive piston ring factory in the world, with its capacity of 12,000 rings per working hour, there is every reason to believe, says this manufacturer, that further expansion will soon be necessary.

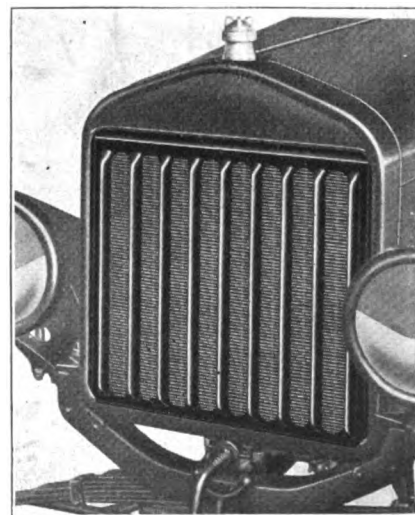
Radiator Protector Saves Radiator . And Makes Better Looking Car.

As a protective device, the Stewart radiator protector for Ford cars is declared to be a most practical and cheap form of insurance.

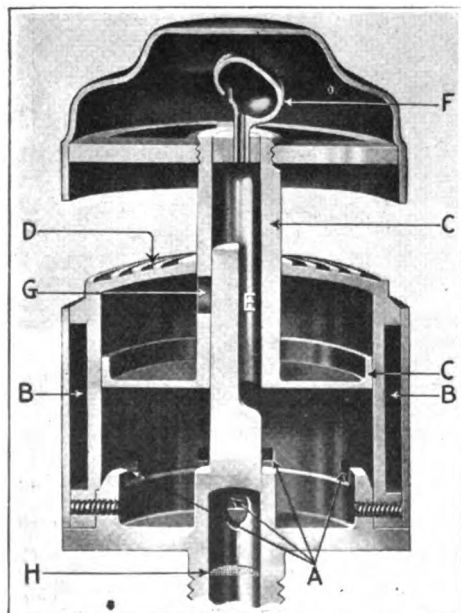
However, it is designed not only to protect the radiator of the car from being bumped to pieces, but it also adds materially to the attractive appearance of the car.

Car owners appreciate the security against accidents and damage to the radiator afforded by the Stewart radiator protector, for it thus makes motoring more enjoyable.

Descriptive literature, prices, etc., may be obtained by writing to the Stewart Iron Works Co., Inc., Cincinnati, Ohio.

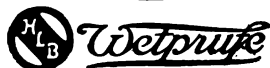


Stewart Radiator Protector Keeps Radiator From Being Damaged.



Showing Details of Construction of the Sentree.

LEATHER Automotive Products



Wetprufe Flat Fan Belting
Vee-Flex, Vee-Sol and
V-Lug Roll Fan Belting
Tough-Tan Leather V-Belts
Group Fan Belts
Leathertex and Wetprufe
Cone Clutch Facings
Universal Joint Discs
Anti-Squeak Lacing

INCREASE your profits—make more sales and better satisfied customers. Genuine leather products have come back into their own. They are better than substitute materials and **now are as low priced.** That's why every dealer should be interested in our complete line—

Sold by leading dealers everywhere. Ask your jobber for full information or write today for our complete catalog and discounts.

HIDE, LEATHER & BELTING CO.

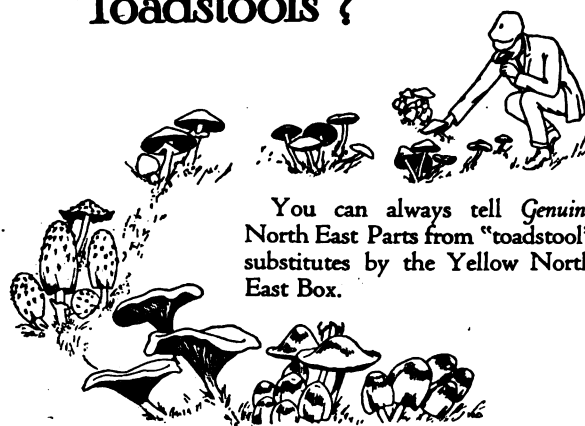
Established 1870

DETROIT
EVANSVILLE

INDIANAPOLIS

MEMPHIS
NEW YORK

Mushrooms or Toadstools?



You can always tell Genuine North East Parts from "toadstool" substitutes by the Yellow North East Box.

Genuine North East Service Parts are distributed to the trade by

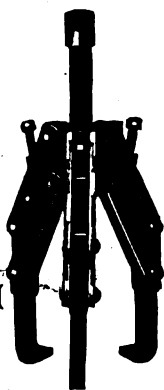
NORTH EAST SERVICE INC.
ROCHESTER, N. Y., U. S. A.

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| Atlanta, Ga. | Rochester, N. Y. |
| Chicago, Ill. | San Francisco, Cal. |
| Detroit, Mich. | Windsor, Ont. |
| Kansas City, Mo. | London, Eng. |
| New York City | Paris, France |



**THE FRISZ
WHEEL
& GEAR
PULLER**

**NEVER
SLIPS**



*Made in
FOUR SIZES
to take care
of all size
gears and
wheels*

Don't Waste Time and Lose Money

fussing with a wheel puller that grips poorly and slips.

Get the Frisz Wheel and Gear Puller. Its massive gripping fingers hold like a ship's anchor. They never slip and their grip is equally automatic, whether expanding or contracting. The drop forged, high carbon, nickel steel arms are always parallel with the power screw. This means a pull always in a straight pull—an easy pull.

Free from complicated parts. Needs no special attachments. Made of finest materials; heavily reinforced where stresses come heaviest.

Get the Frisz Wheel and Gear Puller from your jobber—today.

JOBBERs—Write for our interesting proposition.

FRISZ MFG. CO.

34th and Illinois Sts.

Indianapolis, Ind.

DO YOU KNOW

That by installing common rings in a motor you merely postpone trouble for a short while, as they lose their efficiency in a few thousand miles driving?

Always Play Safe—Use

UNIVERSALLY SUPREME!

KENDELL

MOST PERFECTED PISTON RINGS



and make your service department the pride of your community, as all Kendell-equipped motors will be as near perfect as human aptitude can devise them.

Stop experimenting at your customers' expense, give them "Kendell's" and they will be your best advertisements, Satisfied Customers.

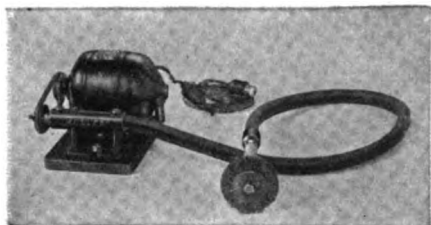
We will gladly forward you complete details, better write or wire us today.

KENDELL ENGINEERING CORPORATION
Fort Wayne, Indiana

Up-to-the-Minute Garage Equipment

Old Tire Man Says Flexible Shaft Buffer Means Better Job.

"Use it on small tires, too? Sure—just as well as on the big ones. I'm not going to sweat holding the darn things to an old stand buffer any more—not when I can



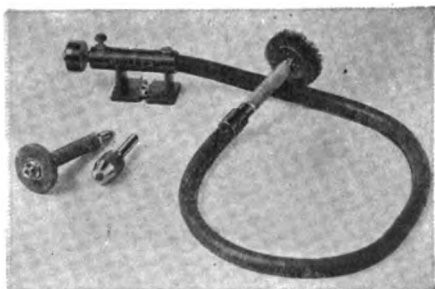
Flexible Shaft Buffer With Motor.

use my Muller flexible buffer and get a repair job that stands up much better in the bargain.

"Why, before I installed this Muller flexible buffer, I used to spend two hours and a quart of gas trying to do the job by hand on the big tires. Yes, sir, how a repairshop can pass up a good flexible shaft buffer is more than I can see. Besides, I've figured it out and found that if it takes only $\frac{1}{4}$ -horsepower to operate a Muller flexible buffer and one horsepower the old buffer stand way, the total first cost of the buffer is paid for in no time."

And that's what an old-time tire man thinks of the Muller flexible shaft buffer, which is being sold by the Muller Flexible Shaft Co., 77 West Seventh St., St. Paul, Minn.

Among the special features to be noted regarding the Muller flexible shaft buffer are: The easy and inexpensive repair of the flexible shaft, should an accident happen, the shaft being built up of short, specially-designed sections which can be replaced by the tire repairman in a few



Muller Flexible Shaft Buffer, Bench Outfit.

minutes at slight cost; the ease with which the complete unit can be removed from the housing in ten seconds; that it is said to give a saving of 75 per cent on horsepower over the old buffer stand style and 50 per cent saving of the repairman's "pep."

Further, it is designed to buff tires prop-

erly, regardless of size, as no buckling of the bead is necessary.

With only a slight expense for additional tools, it can be used to grind cylinders, piston rings, etc., and to bore holes up to $\frac{3}{8}$ -inch, making it an all-round efficient tool.

The Flexible shaft buffer without electric motor, known as the "bench outfit" has proven the most popular, says the manufacturer, as it can be hooked up to counter-shafting, large motors, or air compressor systems so easily.

A Muller flexible shaft buffer, bench outfit, and a good $\frac{1}{4}$ -horsepower motor, mounted on a wooden base, gives a first-class portable buffer. The bench outfit can be easily attached to the regular motive equipment in your shop, or will be equipped with motor for you if desired.

It will be of interest, also, to note that the manufacturer has announced a reduction in price of this product, in keeping with the times. A Muller flexible shaft buffer is sold with a 90-day guarantee.

You will want to know more about the Muller flexible shaft outfits, and can obtain complete details by writing the manufacturer at the address given.

At Last! An "Instant—Positive" Adjustable End Wrench.

A nation-wide demand for an end wrench that will adjust instantly and stay adjusted until the nut is loosened or tightened is at last satisfied, it is declared, in the Gellman

The wrench is drop-forged, of the highest grade steel, which allows a carbonized hardening process that will enable one to use the wrench under several hundreds of pounds of pressure. Indeed, it is said to be a Herculean tool, yet light in weight and thin enough to work in cramped places.

The screw is eliminated from this wrench, which, at the same time, eliminates bulkiness in the head. The handle member forms the lower jaw and is notched at right angles to the gripping face, while the movable upper jaw is also notched and can be moved up or down when the notches are pulled out of engagement.

Simply by pressing with the thumb of the hand holding the wrench, on the corrugated part of the movable jaw, and disengaging, the upper jaw will move instantly up or down, without any friction, to the adjustment desired. The wrench can be used in any direction desired. There are no parts to get out of order.

The wrench is manufactured in sizes of 6, 9 and 12 inches. Each weighs 4, 10 and

20 ounces, respectively. The 6-inch size will do for light work, while the man doing heavier work will find the 9-inch and 12-inch wrenches built for "duty" and at the same time able to take large nuts and all the way down to the real small ones.



No Posts, Screws or Threads—The Gellman Is All Wrench.

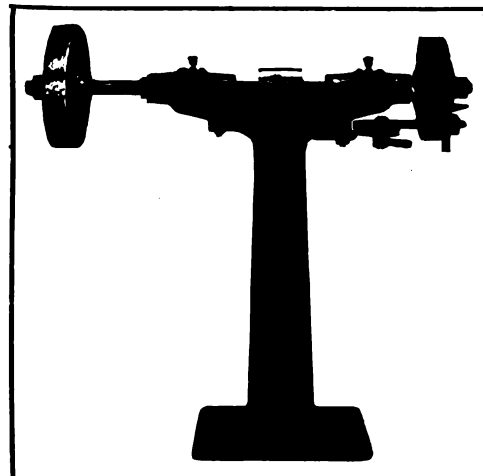
There are "no posts, screws, or threads—it's all wrench."

Jobbers and dealers should write The Gellman Wrench Corp., Dept. G, Chamber of Commerce Bldg., Chicago, for sample and its popular trade proposition.

Combined Polishing and Grinding Machine Valuable in Shopwork.

A combined grinding and polishing machine, which has been proven by experience to be one of the most substantial now on the market, is shown in the illustration. This is also declared to be a very desirable type for garage shops which wish to use a grinding wheel on one side and a polishing wheel on the other side, having an extended arbor with ample room to polish large and bulky parts.

It is a machine which has also been found



Combined Polishing and Grinding Machine.

exceptionally satisfactory for tire work, and is here shown with a rotary rasp and wire brush, ready for this class of work.

This machine is made in five sizes, either with plain or tight and loose-pulley drive, all mounted on column, or three of the sizes may be used for bench.

The Best Way We Know How To Tell And Prove It To You.

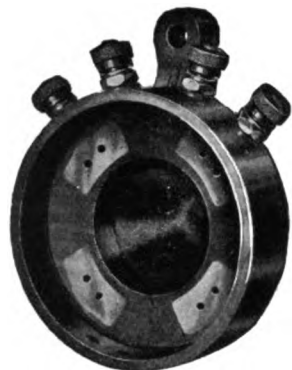
August 28th, 1922.

Gentlemen:—

I have used your BLU-BLAZE TIMER on my Ford Coupé this season and so far have driven nearly ten thousand miles without one bit of Timer trouble. While last year I drove fifteen thousand miles and used six Timers of other makes. I am satisfied that your Timer is a wonderful one, and am desirous of handling same exclusively. I am on the road and have been for twenty years. I would like to get a protected territory on your Timer, Minnesota, Wisconsin and Michigan preferred, but will take anything you will give me. If you cannot or do not do this, please give me your prices in quantity lots, say in one dozen lots, fifty lots, one hundred lots and also in five hundred lots.

Yours truly,
O. J. La B.
Iron River, Michigan.

Below — The simple rotor, showing copper-carbon brush.



The Condensite shell, showing polished raceway and contacts.

LIST PRICE
In the East.....\$3.00
In the West.....\$3.50

Other similar letters received daily. Originals on file with us.

Dealers: Users are the best advertisers of "BLU-BLAZE TIMERS."
Ask us about sales possibilities.

Blublaze Motor Specialties Corporation

Factory: 43 Seventh Ave.,
Long Island City, N. Y.



Be Honest—It Pays

When a customer comes to you for a Ford replacement timer be honest; don't hand out any timer you may happen to have and call it best—make a regular customer, show the timer that really has a new idea.

F R M TIMERS
FOR ALL
FORD MOTORS

So that you may show this wonderful new timer to your trade without investing a cent, we will send to reliable dealers anywhere in the U. S. a trial order of 1 to 6 F R M Timers, to be returned in 30 days, if found unsatisfactory in any way.

Use the coupon right now

Dept. **F R M Mfg. Co.**
Fairbury, Ill.

Dear Sirs:

Date.....

You may send us by parcels post..... F R M Timers for.....model Ford Cars, and bill us for same at dealer's price. We will remit or return timers to you within 30 days.

Firm name.....

Signed

Address

Reference



For every automotive need

Repairmen from near and far have found it worth while to order their gears from us because they are always able to get what they want when they want it. We furnish promptly transmission, differential or silent-timing gears. The quality of Ganschow Gears is almost proverbial.

Feel free to consult our engineering department.

Let Us Quote You

WM. GANSCHOW COMPANY

1002 Washington Boulevard
Chicago, Illinois



NOW READY!

The New 1922 Issue of the

Wells' Automotive Wiring Manual

(Sixth Consecutive Year)

New Issue! New Cover! New Price!

This nationally known, standardized and official compilation of BLUEPRINT car wiring diagrams has been thoroughly revised to include complete external wiring of all standard American cars from 1911 to date.

NOW bound in attractive and substantial loose-leaf cover, permitting easy insertion of later diagrams.

NOW the most complete, authentic and correct compilation on the market.

NOW priced at only \$12.50 delivered. Formerly \$15.00. NOW is the time to get your copy as part of your shop equipment.

Also combined in one large loose-leaf volume with Wells' Auto-Electricians' Handbook if desired. This one volume gives all available data covering both external and internal wiring, together with test and performance on every make and model (over 850) of generator, motor, regulator, cutout, etc. Price \$22.50 delivered.

Write today for descriptive circular.

Automotive Publishing Company

448 So. Dearborn Street, CHICAGO

The Saint Louis Machine Tool Co., also makes another line, under the trade name "Saint Louis," of which there are six sizes—either for overhead countershaft or self-contained countershaft drive.

In addition, this company manufactures a full line of grinding and polishing machines, consisting of 120 different sizes and types.

The outstanding features of these machines are: The bodies are all cored section, which distributes the metal very much better than solid section bodies; they all have self-oiling bearings, which is a feature of great importance in this class of machinery; all have 0.40 carbon steel arbors; all have square threads; pulleys are all forced on instead of set-screwed; and all bearings are lined with an extra high grade of babbitt.

The Saint Louis Machine Tool Co., 902 Loughborough Ave., St. Louis, Mo., has a first class catalog which it will be pleased to forward to anyone interested on request.

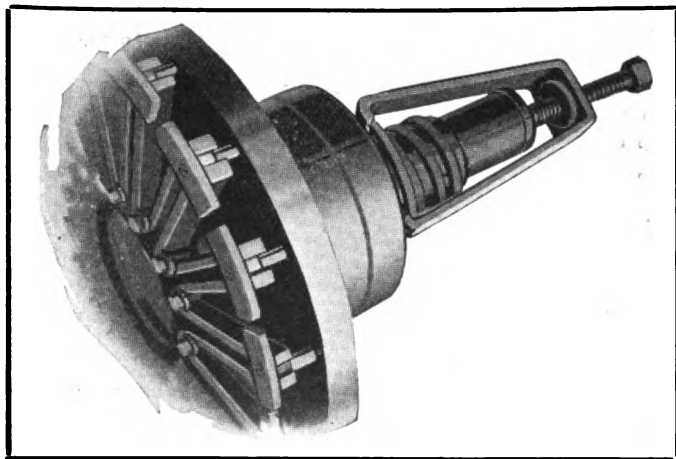
A Tough Job? The Universal Garage Tool Just "Eats 'Em Up!"

It makes one think of the old tale of Aladdin and his lamp when we read of the many things that the Universal garage tool will do. You remember that all Aladdin had to do was rub the lamp and he got whatever he wished for.

With the Universal garage tool, it would appear that all you have to do is to think of a job of repairwork that you want to do and this handy tool is just the one to handle it in a jiffy.

For instance, you may have a Chevrolet clutch to be pulled. This difficult job, it is declared, is made perfectly simple and easy by using the Universal garage tool. There is no fussing with jack, tackle, block and maul. Just make the hitch, give the screw a few turns to compress the spring, lift out the pin and the job is done. When ready to reassemble the clutch to the car, the process is simply reversed.

Pulling a Ford clutch is easy with the Universal, as the illustration shows. A large slotted sleeve is furnished for working on cars having the larger Ford spring.



Shows How Easily a Ford Clutch Is Pulled.

When pressing out a piston bushing, the Universal garage tool gives a handy, powerful and sure combination. In fact, it is said that repairmen who use it insist that this tool has an arbor press "backed off the boards" for the job. The piston cannot slip or turn. When pressure is applied by turning the screw, the bushings simply have to come, and the work is sure, quick and easy. The yoke is made to handle practically any size of piston.

No wheel is too stiff or stubborn; it is said, for the Universal garage tool. No hammering is necessary, and there is no danger of marring or breaking a wheel.

For pressing triple gear bushings in or out this tool is just as handy and sure as for piston bushings. There is no guesswork, no hammering or marring of gears or bushings. Your customers don't have to wait until the parts damaged in repairing are replaced.

The Universal garage tool will also drill holes in any position where the jack can be braced, and so saves many a job of tearing down.

These are only a few of the many uses to which this tool can be put. With it, heavy work that you may have been sending out to the machine-shops or blacksmiths can be handled in your own shop, thus saving time and money and making quicker service possible.

Axles and frames can be straightened with it, and it is particularly useful for pulling timing gears and transmission drums. You don't have to take the jobs to machines in the shop—instead you take the Universal garage tool to the jobs.

The tool is made entirely of steel, all parts subject to severe bending stresses being forged, and parts that are subject to wear are case-hardened.

You will want to know more about this many-purposed tool, which is also being offered for a very reasonable price. Write the Unigarto Co., Fort Wayne, Ind., for full information.

New Sepco Electric Battery Steamer Automatic in Operation.

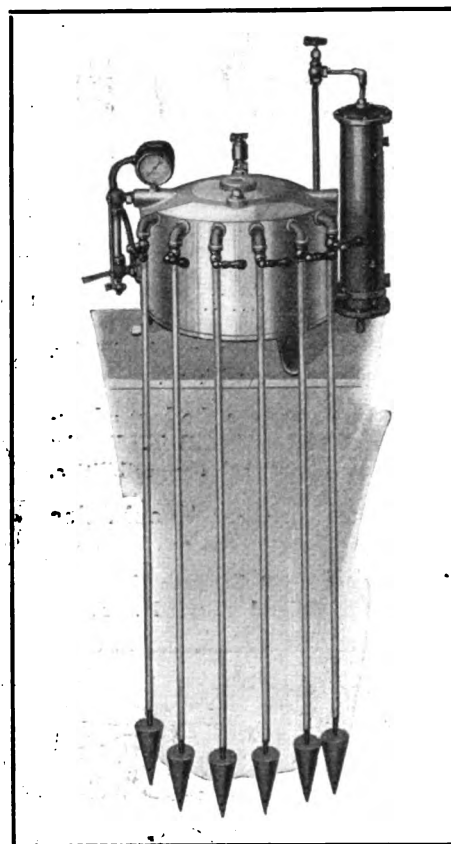
Battery service stations will be greatly interested in the new Sepco electric battery steamer. It is said that the tops of any battery may be safely melted and the cells removed in from six to ten minutes.

The steamer is automatic in operation. Once the proper amount of water is placed in the boiler and the current turned on, the automatic pressure gage will turn off the current when a steam pressure of 15 pounds has been reached. No atten-

tion from the operator is required. Only sufficient current to maintain the proper steam pressure will be used.

The boiler is made of heavy cast-aluminum and is equipped with water glass, safety-valve, filler connection, air vent and a large hand hole which provides an easy means for cleaning the boiler.

One hundred per cent efficiency is assured, it is said, because all heat is immediately



The Sepco Electric Battery Steamer.

transferred to the water, and steam can be made quickly. The heating units are of the latest double-radiating-wall immersion type, there being two separate 1,000-watt units installed in a special recess provided for them in the base of the boiler.

Long and satisfactory service is provided for by the rugged and unique construction of the Sepco steamer.

These steamers are furnished for 110-volt, two or three-wire service, alternating or direct current. Each steamer is equipped with three steam-hose battery leads, the ends of each being equipped with a special nozzle to insert into the filler hole of any battery. The ends of the nozzles are perforated so as to direct the steam against the battery top, thus insuring the fast melting of the material without injury to the cells of the casing.

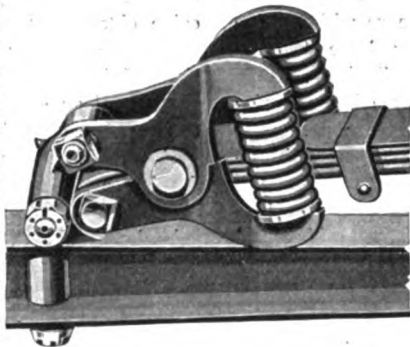
A water still can be furnished which will produce approximately three-quarters gallon to one gallon of distilled water per hour.

Circulars and discounts will be furnished on request by the Automatic Electric Heater Co., Warren, Pa.



Star W-X Outshines All Other Ford Shock Absorbers

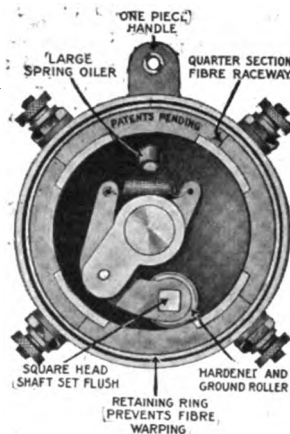
Give the greatest flexibility and comfort on either a normal or full load. Do not affect spring mounting of Ford Car. Simplest and easiest to install—car owner can do it himself. The biggest shock absorber ever offered at the price—\$8.00 per set of four. Three styles—No. 1 for Runabouts, No. 2 for Touring, No. 3 for Sedans. DEALERS—Here's a real money maker. Write today for full data.



STAR SPECIALTY MANUFACTURING CO.

227-233 W. Erie St.

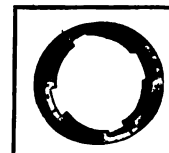
CHICAGO, ILL.



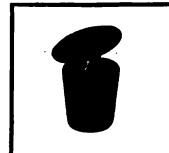
A BETTER TIMER TO TIME 'ER BETTER

The M & R was designed for all types Fords and tractors. On solid ring fibre, two of the wearing surfaces are with the grain and two against grain—one of the main "reasons" for such a quality timer. It's backed by our guarantee. Your customers will be enthusiastic about the M & R. Write for details—now.

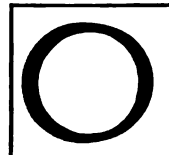
McCulloch Mfg. Co.
216 High Street Boston, Mass.



Raceway—made in four sections—all cut against grain.



Oiler—spring-top type, self-closing, of sensible size.



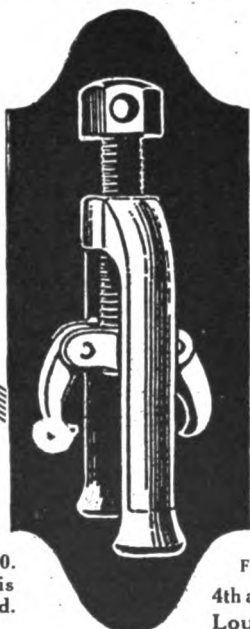
Retaining Ring binds raceway, keeping it absolutely rigid.



Handle—made in one piece and securely attached to shell.

BETWEEN YOU AND ME

If you want to remove valves easily—if you want to lay aside the unwieldy crowbar—if you want to have your customers no longer complaining about broken seats, or springs or washers—use the Buffum Buick valve remover. And tell your customers about it. It's a fast seller. Every Buick owner will want one. Our dealer proposition is most attractive. Write.



Retail price \$2.00. And the tool is fully guaranteed.

BUFFUM TOOL CO.

Factory and General Offices
4th and N. Carolina Sts.
Louisiana, Mo., U. S. A.

*Patronize our
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Unique Combination Routs Three Trouble Makers in Ford Cars.

"See those two engines?" asked the mechanic, as I watched him quickly and skillfully complete the bit of repairwork which was the occasion for my call at his shop. He pointed to two Ford engines on a work table nearby.

"Yes," I replied, "what about them?"

"Just this," answered the mechanic, as he tightened up another bolt, "I happen to know some of the history of the two cars to which those engines belong. Both cars were purchased at approximately the same time. Both were direct from the factory—I know because we sold them."

"Judging from the looks of them, I'd say one of the cars had been driven about two or three times as much as the other," I remarked.

The mechanic smiled. "No, that's just the point," he said. "The mileage for the two cars is almost the same. The fact is that the owner of engine No. 1 over here," indicating the engine which had appeared to me to be in much the better condition, "dropped into my shop one day not long after he bought his car to have me take a look at the engine. I found the usual trouble—the oiling system had not been supplying as much oil as was needed on upgrades, and the feed pipe was considerably clogged with lint from the brake bands. I found some ignition trouble too, because the wiring had become oil-soaked on account of the Ford timer being installed so low."

"It happened that I had just bought a few Three-In-One Units—a combination water, oiling and ignition device—and I was anxious to try the mechanism out. I persuaded the owner of engine No. 1 to try one. I talked to the owner of engine No. 2 about them, also, but he wasn't in a buying mood and said he'd rather wait and see how it worked with engine No. 1.

"Knowing both these men, and that both lived in the neighborhood, I thought it would be worth while to compare the two engines at the end of some specified period. So I got the two men to agree to let me have a look at these engines at the end of three months. The time was up yesterday and, according to agreement, they brought them in."

The mechanic laughed. "I hadn't much more than gotten the two engines out of the car before the owner of engine No. 2 gave me his order for a Three-In-One. It seems the two of them had been comparing notes on the service they had been getting from their cars, and when he heard how much better service the owner of engine No. 1 had gotten, he was practically sold. It needed only the difference in appearance of the two engines to clinch the sale."

"But what is there about this Three-In-One Unit that makes all that difference?" I inquired curiously.

"Well," he answered, "First, it gives an

accessible timing system, which is designed to assure perfect ignition. The timer is an oilless-wipe contact timer, which is raised to avoid inconvenience in getting at the parts and affords a position for the wiring so that it does not become oil-soaked and cause ignition trouble. Perfect combustion prevents carbon and valve grinding and results in greater mileage.

"It also gives a force-feed type gear oil pump, designed to assure perfect lubrication under all conditions. A copper tube from the oil pump to a special connection at the lower petcock leads the oil to the front of the motor. Since the combination is an integral unit, the oil pump cannot discharge the oil through drilled passageways in the casting directly over the gears which drive the unit. Therefore, they have positive and proper lubrication at all times. This also means that the oiling of the entire unit is automatically taken care of.

"The oiling system controls and lubricates the parts systematically at all speeds, upon all grades and at all times, so that there is no danger of clogged pipes, etc.

"The third feature is a positive gear-driven water-circulating pump for keeping the motor cool at all times. The necessity of a special belt is eliminated and so the slippage due to a belt drive is avoided.

"The manufacturer guarantees that the Three-In-One Unit will cut oil bills 35 per cent to 50 per cent."

"Fact is," he concluded, "its advantages are so evident it just naturally sells itself."

The Three-In-One Unit, for Fords, Trucks and Fordson tractors is manufactured by the Hexagon Specialty Mfg., 3630 South Grand Ave., St. Louis, Mo. Write for special proposition to dealers and distributors.

F. R. M. Timer Called "The Brain of Ford Power Plant."

"He's got a brain that works like a steel trap." How often we hear people say that of some successful man whose brain really seems to work with all the surety and precision of a perfectly-timed mechanism. That's the healthy brain in action.

And that's why they call the F. R. M. timer the "brain of the Ford power plant," because it so much resembles a healthy brain in action.

An important feature of the F. R. M. timer is the exceptionally long firing period which is designed to keep a spark in the cylinder from high compression to the extreme end of the stroke, and to burn all fuel and any oil remaining in the cylinder after firing, especially the oil that settles on the plugs and causes the nuisance of spark-plug cleaning.

The race is of cold-rolled steel, mounted in a bakelite insulator, the plates being mounted true to half of 0.001 of an inch and ground true on the surface.

Finest phosphor-bronze is used for the brush, which is extra heavy and held to the race on a 45-degree angle that gives extra

bearing surface. The best oil-tempered steel is used for the construction of the spring that furnishes the brush tension, while the brush holder is die cast of white brass.

The brush is the only wearing part and can be run in oil, the bearing being good for the life of the average Ford and renewable at small cost if worn out.

At present, cast aluminum is used for the construction of the shell, but it is announced that the manufacturer plans to make the shell of the same material as the brush holder as soon as dies can be cast. The wire separator is cast in the shell.

All wires, including light wires, are enclosed in the best grease and damp-proof cable obtainable.

Ready starting under all weather conditions, full development of all fuel into power and an even running motor are said to be assured by the F. R. M. timer.

F. R. M. timers are sold on a "thirty days' free trial, one year mechanical" guarantee.

Write the F. R. M. Mfg. Co., Fairbury, Ill., for further details and terms to dealers and jobbers.

Counterbalanced Crankshafts Stop Motor Noise and Vibration.

"We look upon the counterbalanced crankshaft as one of the most valuable changes which can be made in a Ford motor," declared one of the purchasers of the drop-forged, counterbalanced crankshafts which are being marketed by the Union Drop Forge Co., of Chicago.

This company has, by a special process of drop-forging, designed and developed a one-piece, drop-forged, counterbalanced crankshaft for Ford motors. The counterbalances are not welded to or bolted on the crankshaft, but are a part of it. For this reason, it is said that they cannot break and fly off or loosen.

Every crank is drop-forged, from carefully inspected and analyzed alloy crank steel, scientifically heat-treated and accurately ground-finished, so that it is interchangeable with the crankshaft which may now be in use in the car.

The design and accuracy of finish is said to give such perfect running balance that, when this counterbalanced crankshaft is installed in a motor, noise and vibration cease and the motor runs in perfect condition, with only the low, soft purring sound.

These are the attractive advantages which are attributed to the counterbalanced crankshaft: That it develops maximum power without increasing the fuel consumption; smooths out cylinder explosives; reduces wear on the motor and other parts of the car; lessens repair; lengthens the life of the car; and makes smoother riding.

Write the Union Drop Forge Co., 358 West Grand Ave., Chicago, for descriptive literature and full particulars.

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Do you get estimates?**

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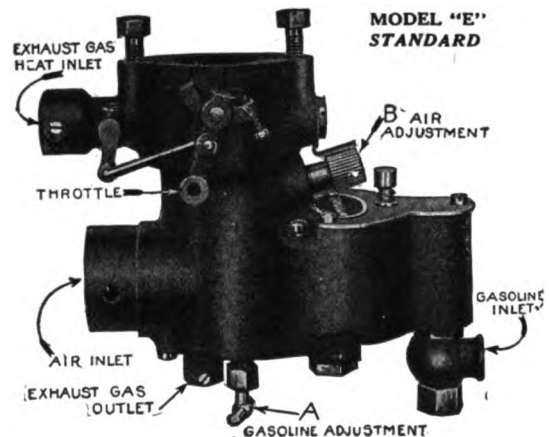
For Fords. Gives positive and quick throttling and allows use of both hands in driving. Installed in 10 minutes by anyone. Simple and durable. Price, \$1.

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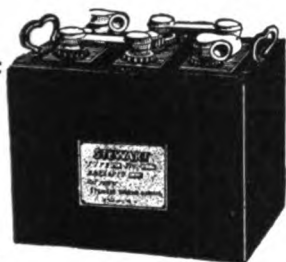
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SATISFACTORY—all 'round.

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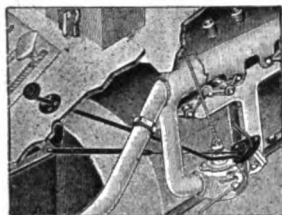


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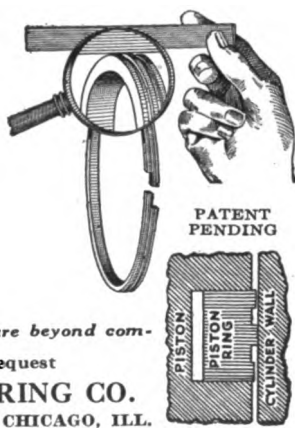
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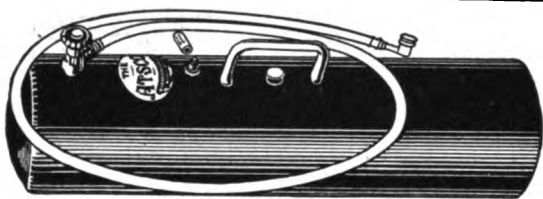
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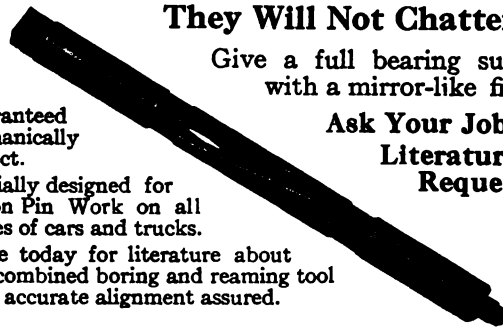
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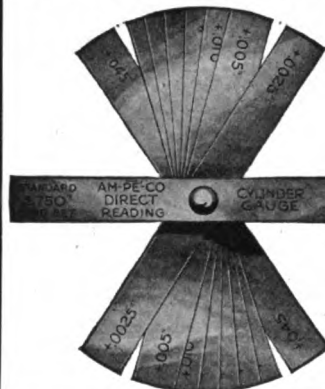
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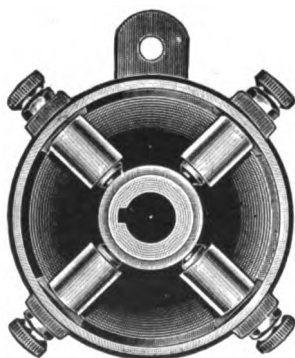
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They overcome spark plug troubles

Plugs that have become fouled with grease or carbon, or have broken porcelains fire perfectly when equipped with them.

An important advantage of the I-X-L Intensifier is that you can see the spark from any angle. If the spark does not show the motorist knows that the battery or magneto is not delivering the proper current.

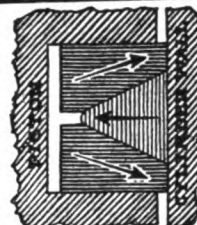
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Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

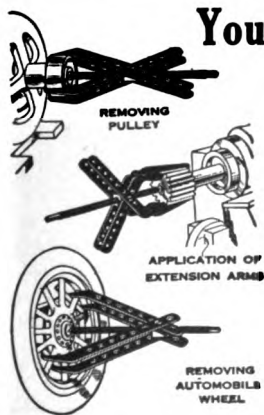
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The "LITTLE GIANT"

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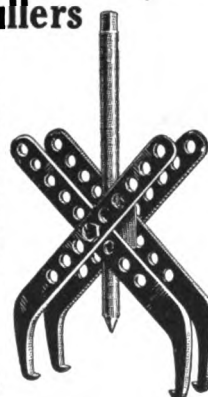
"THE HARDER THE PULL—THE TIGHTER THE GRIP"

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This heavy duty puller is designed to cover a range of work upward from where the "LITTLE GIANT" and other tools leave off. Weighs 100 lbs.—open adjustment 40". Pulls heavy motor truck and car wheels, ship and aeroplane propellers, heavy fly and gear wheels, transmissions, etc., easily. Can't slip off work—no arm locks required. Price complete with wrench and handle, \$50. Where you have a job no other puller will touch you need a "Big Buster."



Champion Air Equipment

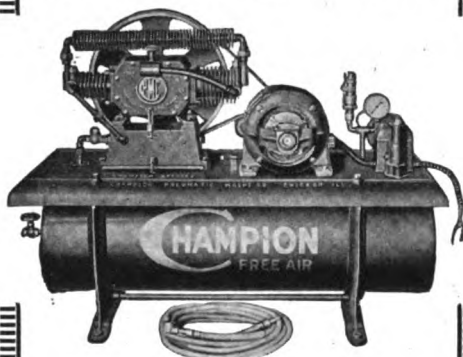
Champion Air Compressors are built in a range of sizes, both single and two-stage, to meet the requirements of every Garage and Service Station. Their installation insures service to the customer, and proper inflation of all sized tires.

For accessibility, ease of operation, freedom from trouble and constant, dependable operation at low cost, they are the best investment offered in pneumatic equipment.

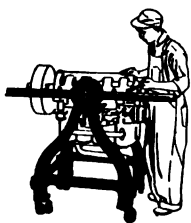
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Champion Pneumatic Machinery Co.

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Continental Auto Parts Co.

Columbus

Indiana

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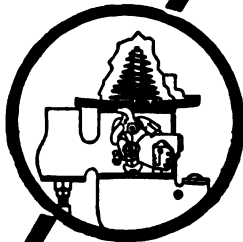
ASK YOUR JOBBER TO DEMONSTRATE THE

CADY PISTON RING COMPRESSOR

IF HE CAN'T, WRITE US

WAGLEW MANUFACTURING COMPANY

SYRACUSE, N. Y.



A Big "Idea" Behind Big Sales!

Thousands of Accessory Dealers have found that the

POMEROY ^{PATENTED} _{ELECTRIC} GASAFIER

leads the leaders.

Now entering fifth year.

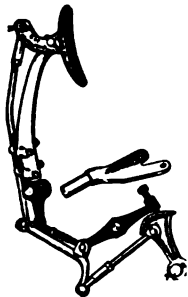
For easy, cold weather starting—it's there. Saves 15% gasoline! Takes the strain from the battery. Makes hill climbing easy. Lasts as long as any car lasts. The price is \$5.

Of course, we can't see all of you, but we can tell all of you how to increase your profits at a season when other accessories are slow. Dealers in 38 states and Canada have found our proposition worth while.

Your territory is ready and you may get exclusive sale. Write without delay.

POMEROY ELECTRIC CO., Inc., Mfrs., 40 East Main St., Rochester, N. Y.

TWO FORD ACCESSORIES TO INCREASE YOUR SUMMER SALES

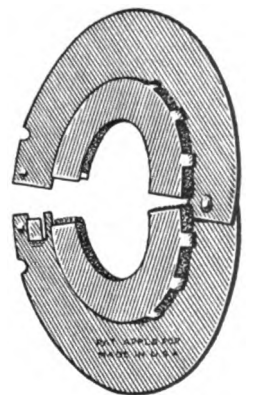


THE B & C NEUTRAL PEDAL

No more guesswork as to neutral position. The B & C provides a positive determined neutral position, independent of emergency brake connections. Quicker to start, quicker to stop, quicker to reverse with the B & C. Every customer who has a Ford will need the B & C and want it.

THE AUXILIO OIL SHIELD

Keeps the motor from overheating, prevents fan belt's slipping, by taking care of oil and keeping belts dry. Made of steel parts hinged and provided with catch for locking in position on crankshaft. Felt gasket absorbs and throws off oil before it reaches belt. Assures motor efficiency.



Write for prices today.

THE BURNHAM-COTE COMPANY
Holyoke Mass.



Mends punctures and blow-outs TO STAY MENDED.

This is the original, the genuine, no heat, no cement, no gasoline inner tube repair. Patents, fully covering process, pending.

Notice—Dealers who are interested in securing the most profitable and aggressive sales co-operation ever offered on an automobile product will please write direct to manufacturers.

ROBERT M. BOWES CO.,

INDIANAPOLIS

BUYERS' REFERENCE

AIR COMPRESSORS

Brunner Mfg. Co., Utica, N. Y.
Champion Pneumatic Machinery Co., 3164 S. Chicago Ave., Chicago.
Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.
Globe Mfg. Co., Battle Creek, Mich.

AIR HOISTS

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

AIR TANKS

Air Tight Steel Tank Co., Pittsburgh, Pa.

AMMETERS (POCKET and DASH)

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, Ohio.

ANTI RATTLES (Window)

Autoquip Mfg. Co., 495 W. St. Paul St., Rochester, N. Y.

AUTO ELECTRIC SUPPLIES

H. P. Manly, 1010 S. Michigan Ave., Chicago.

AXLES (EMERGENCY)

H. G. Faro Co., 1410 S. Michigan Ave., Chicago.

AXLE STRAIGHTENERS

The Unigarto Co., Ft. Wayne, Indiana.

BATTERIES

Stewart Storage Battery Co., Central Ave. at Sixth St., Marshfield, Wis.
W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

BATTERY REPAIR & TESTING EQUIPMENT

W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

BEARINGS

Western Bearings Co., 2831 S. State St., Chicago, Ill.

BOOKS

Automotive Publ. Co., 448 S. Dearborn St., Chicago.
American Technical Society, Chicago, Ill.

BOOKKEEPING AND ACCOUNTING SYSTEMS

Comfort Printing Specialty Co., 101 No. 8th St., St. Louis, Mo.

BORING MACHINES

Winterknight Equipment Co., 1327 Race St., Philadelphia, Pa.

BRAKE AND TRANSMISSION LININGS

Mikesell Bros. Co., 156 N. La Salle St., Chicago.

BREEZE BRACKETS

Buckstaff Breeze Bracket Co., Lincoln, Nebr.

BUMPERS

Metal Stamping Co., Long Island City, N. Y.

BUSHING REMOVERS

Albertson & Co., Sioux City, Iowa.

CAR HEATERS

The Kokomo Electric Co., Kokomo, Ind.

CARBURETORS

Marvel Carburetor Co., Flint, Mich.

CLEANERS

States Chemical Co., 630 W. Austin Ave., Chicago.

CLUTCH FACINGS

Mikesell Bros. Co., 156 N. La Salle St., Chicago.

COUPON BOOKS

National Checking Co., 269 Chestnut St., St. Paul, Minn.

COVERS

Kennedy Car Liner & Bag Co., Shelbyville, Ind.

CRANES

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

GREASERS (For Repair Shops)

Foster Bros. Mfg. Co., Utica, N. Y.

CYLINDER REBORING AND EQUIPMENT

Butler Mfg. Co., Indianapolis, Ind.

Storm Mfg. Co., Minneapolis, Minn.

Trindl Co., 2917 So. Wabash Ave., Chicago.

CYLINDER REGRINDING

Trindl Co., 2917 S. Wabash Ave., Chicago.

CYLINDER GAUGES

Am-pe-co Sales Co., Marshalltown, Iowa.

DUST CAPS

A. Schrader's Son, Inc., Brooklyn, N. Y.

ELECTRICAL REPAIRS

Sampson Electric Co., 2334 So. Wabash Ave., Chicago.

ELECTRICAL TESTING EQUIPMENT

Automotive Electro Technologist, Box 115, Fullerton, Cal.

H. P. Manly, 1010 S. Michigan Ave., Chicago.

W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

ELECTRIC FURNACES

Fries Mfg. Co., 3416 N. Illinois St., Indianapolis, Ind.

ENGINE STANDS

Continental Auto Parts Co., Columbus, Ind.

EXTENSION REELS

Akmeo Auto Products, 425 Jefferson Ave., Rochester, N. Y.

FAN BELTS

Hide, Leather & Belting Co., 229 S. Meridian St., Indianapolis, Ind.

FIRE FIGHTING EQUIPMENT

Flexlume Sign Co., Niagara St., Buffalo, N. Y.

GARAGE EQUIPMENT

Continental Auto Parts Co., Columbus, Ind.

H. G. Faro Co., 1410 S. Michigan Ave., Chicago.

Storm Mfg. Co., Minneapolis, Minn.

Watervliet Tool Co., Albany, N. Y.

Zinke Co., The, 1323 So. Michigan Ave., Chicago.

GARAGE TOOL

Unigarto Co., 310 So. Cornell, Fort Wayne, Ind.

GASIFIERS

Pomeroy Electric Co., 43 E. Main St., Rochester, N. Y.

GASOLINE PUMPS AND TANKS

Wayne Tank & Pump Co., Fort Wayne, Ind.

GEARS

Wm. Ganschow Co., 1002 Washington Blvd., Chicago, Ill.

GEAR AND WHEEL PULLERS

Continental Auto Parts Co., Columbus, Ind.

Fries Mfg. Co., 3416 N. Illinois St., Indianapolis, Indiana.

Premier Electric Co., 3800 Ravenswood Ave., Chicago.

GREASE GUNS

Frank Rose Mfg. Co., Hastings, Neb.

H. G. Faro Co., 1410 S. Michigan Ave., Chicago.

GREASE PUMPS

H. G. Faro Co., 1410 Michigan Ave., Chicago.

HOOD SILENCERS

H. G. Jorgenson, Hampton Road, Erie, Pa.

American Technical Society, Chicago, Ill.

LENSES

C. A. Shaler Co., 372 Fourth St., Waupun, Wisconsin.

LIGHTING WIRE ASSEMBLIES

Turner Mfg. Co., Kokomo, Ind.

MAGNETO METERS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

NEUTRAL PEDALS

Burnham-Cote Co., Holyoke, Mass.

OIL PUMPS AND TANKS

Wayne Tank & Pump Co., Fort Wayne, Ind.

American Oil Tank & Pump Co., Cincinnati, Ohio.

OILS AND LUBRICANTS

Consumers Oil Co., 225 No. Michigan Ave., Chicago, Ill.

National Refining Co., 2002 Rose Bldg., Cleveland, Ohio.

OIL SHIELDS

Burnham-Cote Co., Holyoke, Mass.

PACKINGS

Mikesell Bros. Co., 156 N. La Salle St., Chicago.

PARTS, SERVICE

North East Service, Inc., Rochester, N. Y.

PISTONS

Am-pe-co Sales Co., Marshalltown, Iowa.

Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON PINS

Burgess-Norton Mfg. Co., Geneva, Ill.

Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON RINGS

Butler Mfg. Co., Indianapolis, Ind.

Krebs Piston Ring Co., 117 No. Jefferson St., Chicago.

Kendall Engineering Co., Fort Wayne, Ind.

Leeseberg Machine & Mfg. Co., Fostoria, Ohio.

Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON RING COMPRESSORS

Waglow Mfg. Co., 700 Manlius St., Syracuse, N. Y.

POLARITY INDICATORS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

PRESSES

Continental Auto Parts Co., Columbus, Ind.

PRESSING AND PULLING MACHINE

Unigarto Co., 310 South Cornell, Fort Wayne, Ind.

PUMP CONNECTION

A. Schrader's Son, Inc., Brooklyn, N. Y.

PUMPS

Air-Tight Steel Tank Co., Pittsburgh, Pa.

Autoquip Mfg. Co., 495 W. St. Paul St., Rochester, N. Y.

Frank Rose Mfg. Co., Hastings, Neb.

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

RADIATOR CAP CONDENSERS

Alert Alarm Co., Chicago, Ill.

RADIATORS

Jaffe Radiator Co., 741 W. Van Buren St., Chicago.

REAMERS

Watervliet Tool Co., Albany, N. Y.

REBABBITTING SERVICE

Indiana Watkins Co., Indianapolis, Ind.

RESEATING REAMERS

Albertson & Co., Sioux City, Iowa.

RECTIFIERS

Sterling Mfg. Co., Cleveland, O.

RUNNING BOARD MATS

Mikesell Bros. Co., 156 N. La Salle St., Chicago.

SHOCK ABSORBERS

Indiana Parts Co., Richmond, Ind.

Star Specialty Mfg. Co., 227-233 W. Erie St., Chicago.

Philip H. Webber & Co., Hoopston, Ill.

SIGNS

Flexlume Sign Co., 25 Kail St., Buffalo, N. Y.

SOLDER

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

SOLDERING FLUX

F. A. Albertus & Co., 266 9th St., Milwaukee, Wis.

Benson Co., A. R., Hudson, N. Y.

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

M. W. Dunton Co., The, Providence, R. I.

SOLDERING OUTFITS

M. W. Dunton Co., The, Providence, R. I.

SPARK PLUGS

Leich Electric Co., Genoa, Ill.

Allen Specialty Co., 2751 W. Lake St., Chicago, Ill.

SPARK PLUG INTENSIFIERS

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

SPRING LEAF LUBRICATORS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

Turner Mfg. Co., Kokomo, Ind.

STORAGE BATTERY TESTERS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

TESTING INSTRUMENTS

Leich Electric Co., Genoa, Ill.

H. P. Manly, 1010 S. Michigan Ave., Chicago.

W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

TIMERS

Blublaize Motor Spec. Corp., 43 Seventh Ave., Long Island City, N. Y.

Dale Mfg. Co., 1223 S. Michigan Ave., Chicago.

F. M. Mfg. Co., Fairbury, Ill.

Leich Electric Co., Genoa, Ill.

McCullough Mfg. Co., 216 High St., Boston, Mass.

Spad Mfg. Co., Inc., 42-B W. 39th St., New York City.

Turner Mfg. Co., Kokomo, Ind.

TIRE PRESSURE GAUGE

A. Schrader's Son, Inc., Brooklyn, N. Y.

TIRES

Geo. K. Culp, Inc., 56 W. 45th St., New York.

Broadway Tire Jobbers, 250 W. 54th St., New York City.

TIRE CARRIERS

International Stamping Co., 400 N. Leavitt St., Chicago, Ill.

TIRE REPAIR EQUIPMENT

Robt. M. Bowes Co., Indianapolis, Ind.

Atlas Auto Supply Co., 680 W. Austin Ave., Chicago, Ill.

C. A. Shaler Co., Waupun, Wis.

TORCHES

Turner Brass Works, Sycamore, Ill.

TOWN PLATES

Frank G. Hough Co., Chicago, Ill.

TROLLEYS

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

TRUSSES (FOR GARAGES)

Leo McDaniel Contracting and Engineering Co., Cairo, Ill.

TUBES

Broadway Tire Jobbers, 250 W. 54th St., New York City.

VALVE CUTTERS AND REFACEERS

M. B. Skinner Co., 552-553 Washington Blvd., Chicago.

VALVE CAPS AND VALVE INSIDES

A. Schrader's Son, Inc., Brooklyn, N. Y.

VALVE REPAIR TOOL

A. Schrader's Son, Inc., Brooklyn, N. Y.

VALVES

Romort Mfg. Co., Oakfield, Wis.

VALVE GRINDERS

Albertson & Co., Sioux City, Iowa.

Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.

VALVE GRINDING COMPOUNDS

Abrasive Sales Corp., 17 E. 49th St., New York City.

VALVE REPAIRING TOOLS

Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.

VALVE REMOVERS

Butum Tool Co., Louisiana, Mo.

VOLTMETERS (POCKET and DASH)

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

VULCANIZERS

C. A. Shaler Co., 353 Fourth St., Waupun, Wis.

VULCANIZING EQUIPMENT

R. G. Haskins Co., Chicago, Ill.

P. S. M. Co., Minneapolis, Minn.

Not Just ONE Profit But

→ 2-R-3 ←

When you sell a 2-R-3 TIRE CARRIER you not only collect one nice profit but pave the way for 2-R-3 more.



Model Y

Simply by showing the 2-R-3 Tire Carrier many car owners may become immediate prospects for a tire, a tube, a rim, and a tire lock; things that they need but did not know how to carry them.

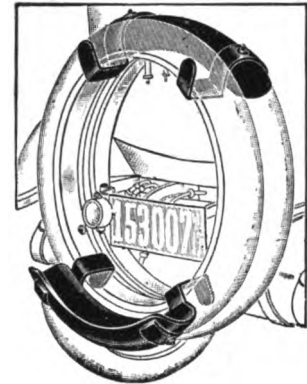
Trouble on the road has convinced most motorists of the necessity of 2-R-3 spares. The motorist who only carries one is skating on the thin ice of the river of trouble, grief, annoyance and delay.

Our attractive and convincing display stand calls the motorist's attention to his need. The simplicity of attaching 2-R-3 Tire Carriers holds an appeal that makes easy sales.

2-R-3 Tire Carriers simply hook on the preceding tire. No tools required to attach. No bolts or nuts to bother with.

Made in two models, S and Y, for all sizes of tires. Prices range from \$2.50 to \$7.00.

If your jobber cannot supply you, write us direct.



Model S

International Stamping Company 400 North Leavitt Street **Chicago, Illinois**

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

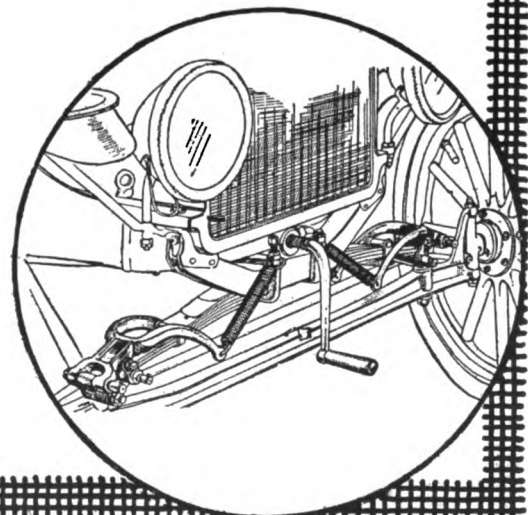
Is adequate proof of the superiority of W. & C.'s. Ford users have earned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd
London, Ont., Canada





The Story of Patches

**IN
FOUR
INSTALLMENTS**

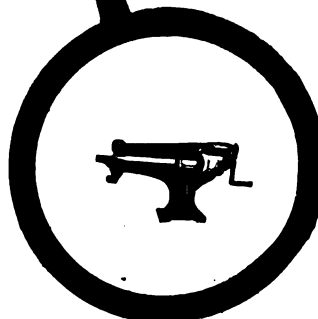
Part 3

THE PATCH TRIMMER

"Do you know," said the go-getter repairman, "I never sell old casings for junk any more? No siree! Because I've found that with my Progressive patch trimmer I can cut 10 or 15 patches from the average casing. Good patches, too. I say 'good' because they're not stiff and flat like readymades and they cost about one-tenth as much. No fabric is too tough for this machine. Cuts clean square patches every time—any length up to 13 inches. Only \$17.50. Or the whole set like I have—tread puller, bead cutter, fabric skiver and trimmer for \$121.50 on easy payments. I say make your own patches—always. It pays, believe me."

(To be continued)

THE P. S. M. CO.
3116-36 Snelling Ave., S.
Minneapolis, Minn.





Comfortable Driving at Zero!

THE KINGSTON CAR HEATER stands between you and the coldest wind that blows. It is a heater that keeps your car warm in zero weather, that warms the car with pure, fresh air, that can be instantly adjusted to meet your wants, that is beautifully and substantially built—an ornament to any car.

Kingston Car Heater

NOTE the New Low Price

DEALERS everywhere should order their stock of KINGSTON HEATERS at once. Last year when cold weather came the demand was so great that some orders were delayed. This year, with greater production, with a finer heater, and with the new low price, the sales of Kingston Heaters will break all records.

THE KINGSTON HEATER is not only handsome and well made, but it is easily installed, and complete instructions are packed with each device. Dealers will find it a quick and easy seller, insuring in every case a satisfied customer.

FORD

Model Complete

\$3⁷⁵

Chevrolet
Overland
Dodge

\$5⁰⁰



IMPORTANT TO THE DEALER

We are going to give the dealer full co-operation in his individual territory on the sale of the Heater. Order at once, so that we may circularize your trade. The Kingston Heater should be your best selling accessory this Fall and Winter. Write or wire today.

THE KOKOMO ELECTRIC COMPANY KOKOMO, INDIANA

BRANCHES
NEW YORK, 245 W. 55th St. BOSTON, 15 Jersey St. DETROIT, 4610 Woodward Ave.
CHICAGO, 1430 Michigan Ave. SAN FRANCISCO, 1235 Van Ness Ave.

KINGSTON



**Spee-Dee—Fresh and Creamy
from Its Tube—and in a
Twinkling—Clean Hands**

THIS “no water” cleanser can now be had in a collapsible container holding enough for three dozen washes. Every tube is banded with a colorful jacket and seeing it packed in a snappy display case on your counter, a customer will need mighty little persuasion to tuck a tube in his pocket and take it along. Try him and see.

STATES CHEMICAL CO.
680 West Austin Avenue
Chicago, Illinois

**Handy Size
Tube**

15¢



In cases of three dozen—\$3.60. Retail—\$5.40. A profit for you of 50%. Great, isn't it? Write for free sample.

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

OCTOBER, 1922

Vol 13—No. 10.
10 Cents the Copy.
\$1.00 Per Year.



This Counter Display Will "Ask 'Em To Buy"

Write for it now. But, better still—ask for two—one for your counter and one for your window. You can't run around and show customers everything that you sell—but this display will tell every one of your customers that you sell Shaler 5 Minute Vulcanizers, and Shaler Patch-&-Heat Units. It's the best "Sales Stimulator" that you ever saw—a "Magnet" that will draw new customers into your store if you will merely put it in your window. It brings 'em in to buy.

SHALER

5 Minute Vulcanizer Is Nationally Advertised

The Counter Display will connect your store with our advertising, and remind your customers of Shaler advertisements which they have read in their favorite publications, at home. There is a big demand for Shaler Vulcanizers and Shaler Patches. Over 20,000,000 Shaler Patches were sold last year, and the demand is steadily increasing.

This counter display is but one of many Shaler Sales Helps which we send to Shaler Dealers FREE on Request. The Shaler 5 Minute Vulcanizer is one of the most profitable items that you sell, because every sale is but the first of a chain of sales of Shaler Patch-&-Heat Units for use with the Vulcanizer. Have you received our new Posters and Window Displays? If not—just ask for them.

C. A. Shaler Company, 360 Fourth St., Waupun, Wisconsin



Comfortable Driving at Zero!

THE KINGSTON CAR HEATER stands between you and the coldest wind that blows. It is a heater that keeps your car warm in zero weather, that warms the car with pure, fresh air, that can be instantly adjusted to meet your wants, that is beautifully and substantially built—an ornament to any car.

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FORD

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Overland
Dodge

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THE KOKOMO ELECTRIC COMPANY
KOKOMO, INDIANA

BRANCHES

BOSTON, 15 Jersey St.

CHICAGO, 1430 Michigan Ave.

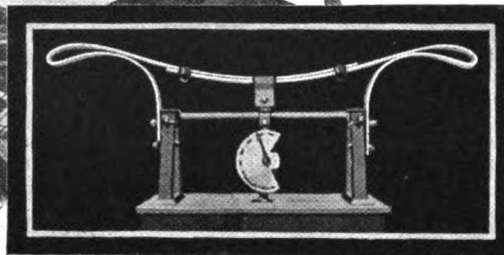
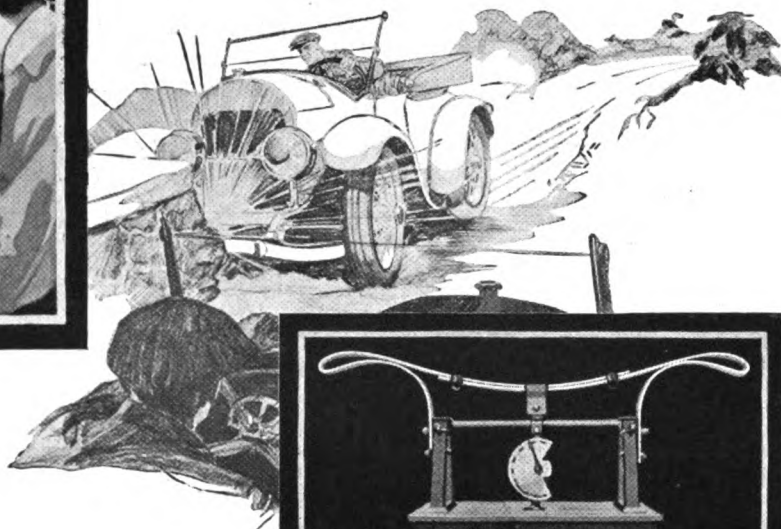
DETROIT, 4610 Woodward Ave.

SAN FRANCISCO, 1235 Van Ness Ave.

KINGSTON



Patented fittings fasten every Lyon Bumper securely; no drilling or frame alterations are necessary.



This factory testing machine is shown putting a Lyon Spring Bumper under a strain of 2200 pounds—equal to most severe bump of a car in motion.

Consider the "Plus" Value

THINK this over. If all bumpers were as protecting and as resilient as Lyon Spring Bumpers, wouldn't they equal Lyon Bumpers in sales and popularity? Well, they don't! There are more Lyon Spring Bumpers sold than all the others put together.

That's why thousands of car agents and accessory dealers have considered the "plus" value of Lyon Spring Bumpers. They have helped us put over a million Lyon Spring Bumpers in service—and every one of them made, and are making, substantial profits.

Lyon Spring Bumpers sell fast. When an unprotected car stops for gas or oil, "ask 'em to buy!" This is how hundreds of Lyon dealers are building up a mighty profitable bumper business. You can do it too; your jobber will send you our proposition.

Jobbers: Here is an accessory that needs no introduction. Write for our proposition.

Retail prices, \$10 to \$25

METAL STAMPING COMPANY, Long Island City, N. Y.



Lyon Straight Bar Bumper



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LYON RESILIENT BUMPERS

BRUNNER

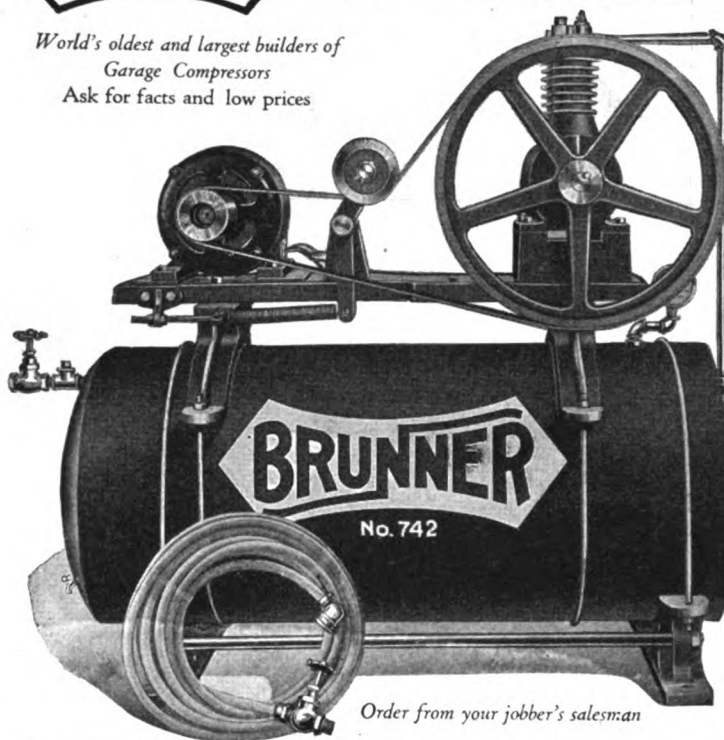
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Ask an Engineer

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

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Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

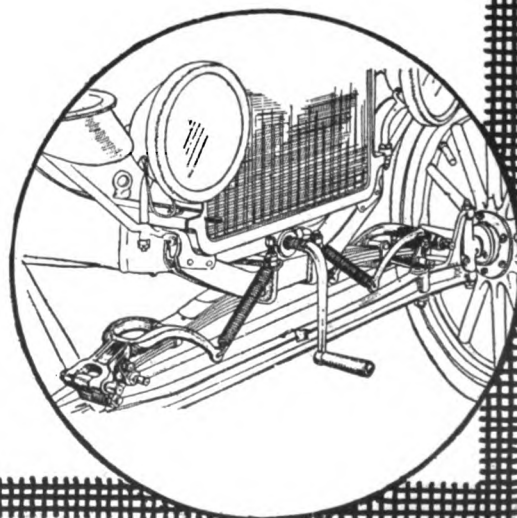
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DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

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Cold weather is approaching. Stock up on Leich Magnetic Timers and give your customers a Timer that fires every shot. No failures on account of gummed up contacts due to thick grease and dirt. Makes Ford cars start easy.

Motors require better ignition in winter than summer. A poor spark and a weak mixture are a poor combination, but a good spark and a weak mixture will start an engine. Cold reduces the volatilization of the gas. That can't be helped, but a good spark can be made by good contacts in the timer, winter or summer.

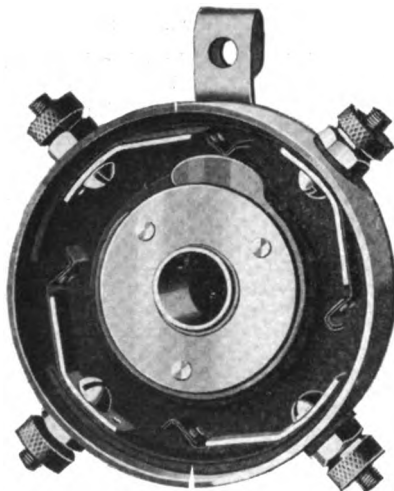
The Leich Magnetic Timer is the one Timer that provides good contacts all the time.

Try a Magnetic Timer, it will prove our statements to you. Use the coupon.

LEICH ELECTRIC CO.

GENOA,

ILLINOIS



Leich Electric Co.,
Genoa, Ill.

Kindly send one Magnetic Timer to prove it will operate satisfactorily in cold weather. List price, \$3.00. Discount to Dealers and Jobbers.

Name

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"It's For You"

"And it's free," said the go-getter garage-man as he pointed to a booklet on his desk.

We picked it up interestedly—"The Story of Patches."

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Name

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American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, *Editor*

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AMERICAN GARAGE & AUTO DEALER, Inc.

116 South Michigan Avenue, CHICAGO

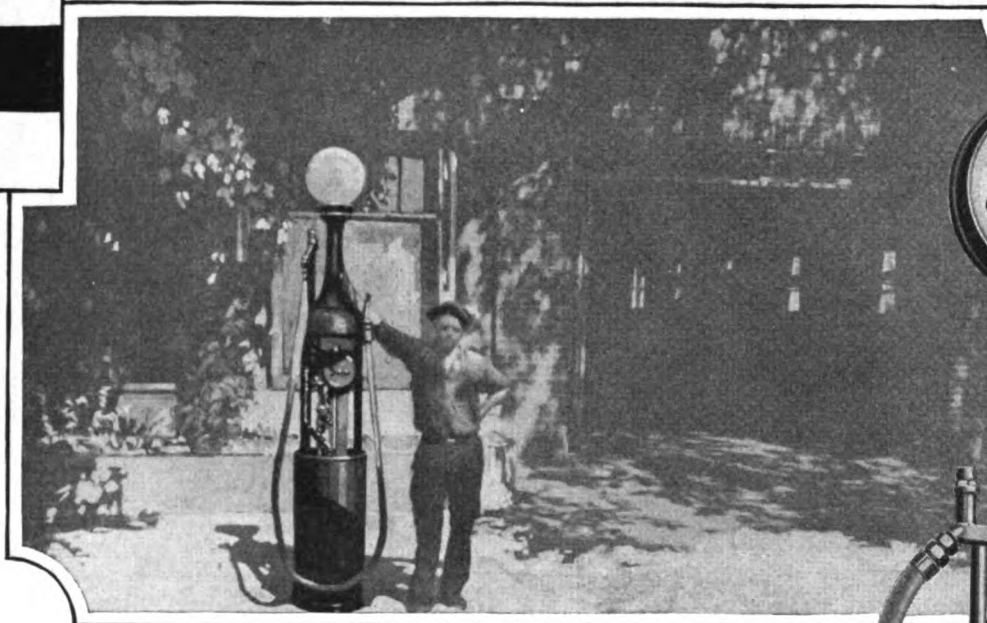
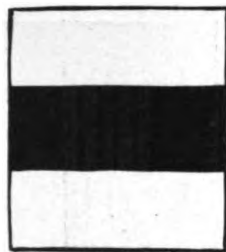
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“Our Wayne Pump has been entirely satisfactory. It has always been accurate and has never given us any trouble. If I were buying another pump, I would not consider any but the Wayne.”

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Stevens and Cary have had their Wayne Honest Measure Pump for more than five years. They have sold 214,642 gallons of gasoline through it with never a dime of expense in repairs or upkeep. And the pump has never failed to test out accurately.

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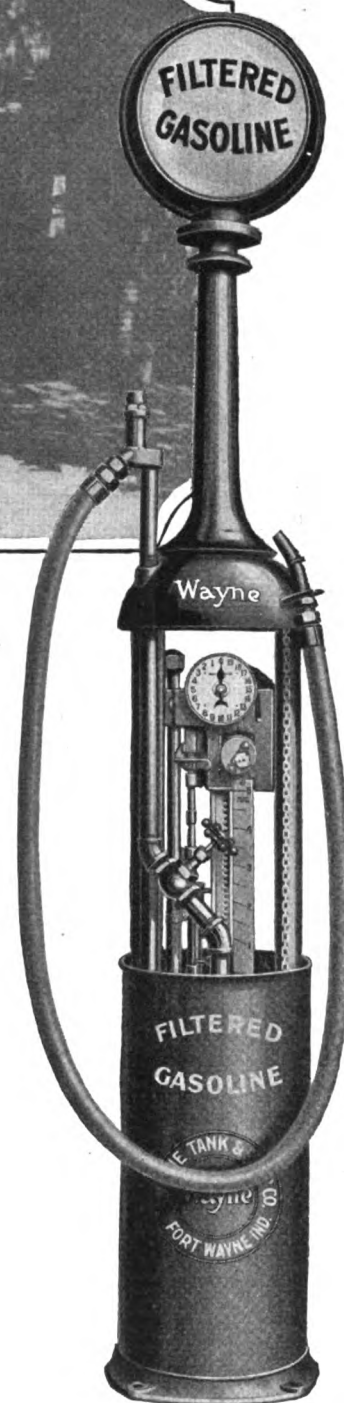
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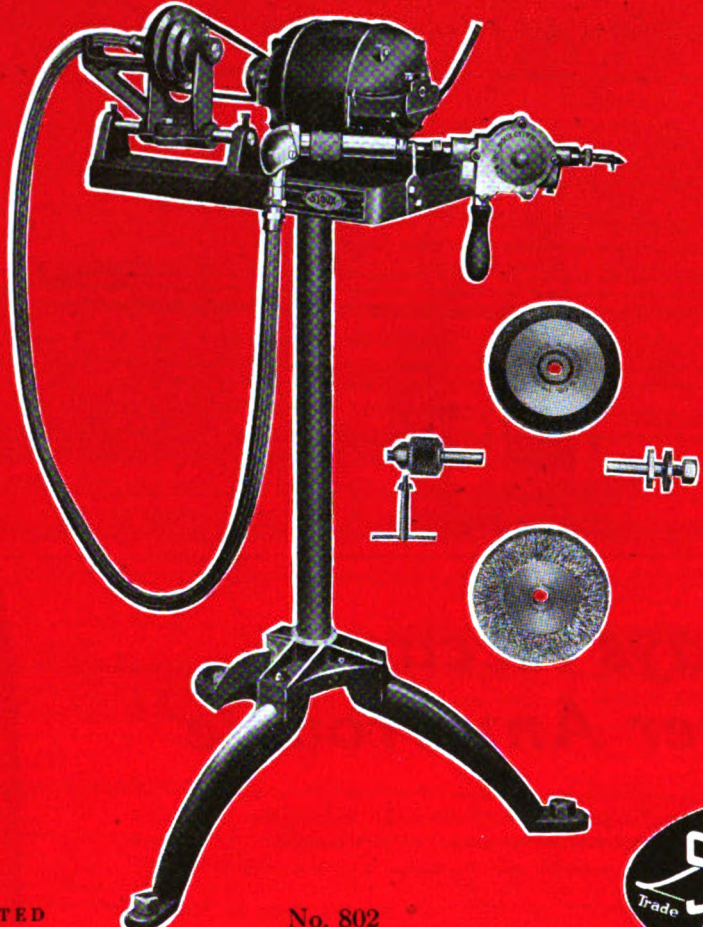
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American Garage & Auto Dealer

*A Business Paper Exclusively for the "Small-Town
Automotive Trade"*

Vol. XIII. No. 10.

CHICAGO

OCTOBER, 1922

Can Strictly Cash Business Succeed?

This Man Proves that It Can by His Prosperous and Steadily Increasing Garage Business—"A Garage," He Says, "Should Be Run Just as Square as a Grocery Store," a Policy Which Has Aided His Rapid Business Growth

By J. E. Bullard

In April, 1917, H. W. Seamans, of Auburn, R. I., decided to go into the automobile repair business. He gathered up a lot of cocoa tins, took a couple of hundred dollars and bought the parts and the tools he absolutely had to have, placed the parts in the cocoa tins, hired a little 18 ft. by 18 ft. garage, took off his coat, rolled up his sleeves and went to work. Today he owns and occupies a 45 ft. by 45 ft., one-story, concrete-block garage, which is already outgrown, and lives in a two-story cottage which he has built out of the earnings of his business.

From a one-man business he has built it up until he now employs four men and never, in winter or summer, since he started in business, has he found it necessary to reduce his working force. It has always been a case of increasing it. Yet he has made no special effort to secure winter business—the growth of the business has been so constant that the natural growth has kept him busy every winter.

There are a number of elements in the methods used by Seamans in conducting his business which seem to account for his success in the automotive field. One of the most important of these is

that he does a strictly cash business.

In the case of the individual car owner, the money for the job, or for the gasoline or oil purchased, is collected before the car leaves the garage. In the case of large companies, where the cars are brought in by drivers not authorized to pay the bills themselves, the bill is rendered the day the job is done and collections as a rule are made the very next day. Even in the case of these companies, there are no monthly accounts, in the sense that a credit garage handles them.

This practice makes it possible for Seamans to have a good balance at the bank at all times with which to meet

Incidentally, this system reduces the amount of bookkeeping to the minimum. All that he has to do is to keep a record of his stock, expenses and cash, in addition, of course, to the individual jobs that are done and paid for when they are done.

"A garage," says Seamans, "should be run just as square as a grocery store."

When he says "grocery store," he means a high-class store, one that has earned the confidence and the trust of its customers, one that is building up its business through square dealing. It is this policy of Seamans that has had a great deal to do with the growth of his business. Just one incident will show how it has worked out in practice.

His garage is located in a community where, though there are many car owners and a few large corporations, there are comparatively few men of any wealth. One day, however, he did a job for a man who was well acquainted with a wealthy business man in the

city of Providence. This man talked with the Providence man about the job the little garage in Auburn had done for him. He talked about the garage in very much the same way a man



Seamans' Garage, Auburn, R. I., Building Up Good Business Through Policy of Square Dealing.

his own bills. It enables him to take all discounts and to take full advantage of any bargains that may be offered him in parts, material or anything else.

Getting the Patronage of the Women

Garagemen and Dealers Who Are Looking for Greater Profits Should Not Overlook the Fact That More and More Women Are Now Owning and Driving Automobiles—Go After Business from Men but Don't Forget the Women!

By Fred Counterman

It is a wise and foxy garageman who admits to himself the importance of pleasing the ladies. More and more, women are becoming owners and drivers of automobiles. More and more, wives, daughters and sisters are interesting themselves in the family automobile and influencing purchases connected with its operation.

In plenty of families where the man of the house looks after the car and orders the repairs, supplies and accessories, he does business at the garage favored by the women of the family.

Go after the business of the men. Make every appeal you can to them—but don't forget the women! It is a safe bet that if you will undertake a careful campaign of interesting the women and making them like your garage, you can increase your business faster than anyone else in town.

In the first place, you must see that women who drive up and stop in front of your place are given immediate attention. I don't mean that you are to wait on them out of their turn, but when a woman stops with her car somebody ought to excuse himself from his present customer long enough to ask "her ladyship" what she wants and tell her how soon she can be waited on.

Men are impatient enough, but women are sometimes more so. It is not that they want you to lay down everything else and look after them, but they want to know that you see they are there, and they want to know how long they must wait. This is good business with men, but it is especially important in getting the favor of the women. Take pains with the women. Put yourself out to accommodate them and, when they see that you are that kind of a man and that they get that kind of attention at your garage, they will come back.

People like to be shown special attention. It pays to give it to them. It pays particularly well to give it to the women. I know it is not easy always to smile and be agreeable and pleasant, but it ought to be your habit.

If you want people to like to do business with you, you must make yourself personally agreeable to them at all times.

There are lots of men who will overlook a crabbed and grouchy manner because of the excellence of the service back of it. Some of the men themselves are surly enough, so that you have nothing on them, no matter how cross you may be. But women give more thought to the lesser matters—to the little attentions they receive; to the pleasant way in which they are met; to the willingness with which you accede to their requests.

You know mighty well how to get on with your women patrons, and all you need do is to act and to see that your employes act in the way you know will create the right kind of an impression.

It is not enough that you treat women patrons right. You must advertise that fact, and go after the available business that will be drawn to you because of that treatment. Announce in your advertising that you will appreciate the patronage of women mo-



A Woman Is More Likely to Buy in Accordance with Her Likes.

torists. Use a form letter something like this:

Dear Madam:

You like a garage that is accommodating, don't you?

We are trying to run the most accommodating garage in town. That's a pretty hard thing to do, but we believe we can do it.

If you receive any but the best kind of treatment at our place you will do us a favor to let us know about it. If you meet with any great delay in service on our part, give us a chance to put the blame where it belongs.

We try to see you at once when you drive in, or when you stop at the curb. We give you just as prompt service as can be given.

We are glad to explain to you anything you do not understand. And we welcome the opportunity to help our women patrons to become better drivers or better mechanics—when they are interested in that part of the automobile's operation.

Come to us for information of any sort about cars and roads and routes. Telephone us for information. Telephone us at any time you want a man to do anything about your car. If you get into trouble on the road, call us up.

Let us know any way in which we can serve you!

Yours very truly,
Jackson's Garage.

You can make this letter into a newspaper advertisement by replacing the "Dear Madam" with a headline, "To Women Motorists!" and omitting the "Yours very truly." You will find women easy to interest in automobile matters—when there is a car in the family.

Of course, you need a mailing list of women who are interested in your kind of business. If there is a registration bureau available, you may be able to list all the women drivers and car owners in your territory; without that, you will have to make up your mailing list by personal work, adding to it, name by name, as you learn of them. Bear in mind all the time that the names of the wives of your men patrons ought to be made a part of such a mailing list.

You already realize how important the woman's opinion is in the matter of an automobile purchase for the family. I wonder whether you realize the full importance of selling her on the features that appeal to her most strongly, and perhaps in a much less degree to her husband.

Appearance and style in a car attract a woman's eye at once. You will do well to feature general appearance and the specific appearance of parts of the car and its equipment, when selling to a woman.

Talk horsepower and upkeep and all those things to a man—but talk convenience and appearance to a woman. Of course, men appreciate looks and

style and women appreciate horsepower, but you understand what I mean. Make your main appeal along the line that carries the chief interest with the prospect.

When you display a car, don't confine the cards on it to calling attention to mechanical construction. Interest the women by asking them to note the upholstery, the convenience of the door arrangement, the finish on the steering-wheel, the comfort of the seats.

I knew a dealer who made a great hit with several women patrons just by seeing that the foot-rail in the tonneau was changed so it fitted their reach and was where they could make the most comfortable use of it, instead of leaving it where standardization had placed it. It pays to look after all of those little things which help to make the car suit the woman who rides in it, whether or not she owns or drives it.

A man may buy a car because it is the car he thinks he ought to buy. He may buy for durability, for mileage, for efficient performance—but a woman is much more likely to buy in accordance with her likes. She buys, or favors buying, the car that pleases her, especially in appearance. If that car does not make good mechanically, she will not be any better pleased, perhaps, than a man—but that will not keep her from following her inclinations when she buys again.

There are many accessories that sell because the women want them and favor their purchase. More women than men give attention to style and the advantage of slip covers. If you are going after such business, appeal to your women's mailing list, rather than to the men's list.

Heating devices, extra lights like tonneau lights, lights for the running board, dome lights, etc., appeal to women—and they will be pleased with the car that has them. They will want to equip their own cars with them. Many things that have little real practical value in the car, but that gives it class and style, interest the women—and they can be sold such devices when a man would not care enough to buy them.

Here is a form letter that might be sent out to the women with a view to interesting them in accessories for cars they already own:

Dear Madam:

Almost any automobile can be made more comfortable and convenient by the addition of certain accessories. Many cars can be given an added style by other such additions.

We wonder whether you may be interested in some of the new and stylish accessories we are able to supply for the type of car you have.

Has it every sort of light you need, including running-board light and tonneau light, spotlight, trouble lamp for making tire changes and repairs at night? Have you a good flashlight in the car, handy in inspecting the car, even in daytime, when you want to look into dark corners, and very handy on the road at night, if only for looking over a bad piece of road before trying it, or for examining the ground where you want to turn around? You certainly need a good flashlight. It helps you in gathering up things you want to take out of the car when you leave it.

And is the car equipped with good shock absorbers, making rough roads easy and saving wear on the car?

Is safety assured by a good mirror for watching the road behind, and by a windshield wiper for keeping the road visible ahead in rain or snow driving?

Won't you come in and let us show you cars equipped, as yours may be, with these devices?

Yours very truly,
Jackson's Garage.

And here is another letter, calculated to appeal to women because of their giving greater attention than men to the matter of safety:

Dear Madam:

Let us make motoring more nearly perfectly safe for you.

Nearly all automobile accidents are preventable, and some motorists are really to blame for the neglect that brings them accidents. May we suggest that any car, perhaps your own, will be the safer for a good mirror that shows the driver the road behind? Many cars are taking the chance without them.

Every car should have a good pair of chains aboard all the time, for use wherever the road is greasy. If you have old chains, let us supply new cross links for them. There is no safety on a wet road without chains. Non-skid tires help only a very little.

Is your car equipped with a perfect rain-vision windshield, or with a windshield wiper that enables you to see the road in stormy weather? It is not safe to take chances in rain or snow.

Have you extra light bulbs in the car to help you out if one or more lamps now in use give out?

Are your tires in such shape that there is no danger of a sudden blowout in a front tire, sending the car into the ditch? Better a new shoe too soon than an accident. Of course, we have everything in tire-repair supplies, but we advise first-class shoes in good condition always on the front wheels, even if you want to take a chance wearing out the old shoes on the rear.

Stop with your car some day and ask us how we would suggest equipping it to make it more nearly safe.

Perhaps your car is already fully fitted. We hope so.

Yours for safety,
Jackson's Garage.

This same copy will make a newspaper advertisement by putting a "Safety First!" headline over it.

You will find it desirable to make window displays that will appeal to women. You ought to be using your

windows anyway, but women in particular are inclined to watch windows for interesting things. They are accustomed to window shopping. So make your displays pretty, attractive, alluring with color and good taste so that they will appeal to women.

Don't confine your window trimming to piling a lot of tires in them, or to setting in a row of miscellaneous accessories, without a bit of taste used in making up a setting or background for the goods. A storage battery on the plain board floor of the window is no more a display than the same battery on the floor of the garage.

Put in a groundwork of contrasting color, a background with an elevation of two or three feet, setting the battery on a little covered platform, with a card calling attention to its virtues. Then you have a display that will attract attention. It will be so with anything in accessories or supplies—and only that attention to detail will cause women to stop and look at what is in the window.

Perhaps you can double your business this summer by going after the patronage of the women. Perhaps not. Try it. It will pay anyway.

French Foreign Automotive Trade Shows a Decided Increase.

French imports and exports of passenger cars and motor trucks showed a decided gain during the first five months of the current year, as compared with the same period in 1921, Vice Consul Levis, Bordeaux, reports. The United States furnished 1,717 of the 2,014 passenger cars imported, the greater part of which were brought in knocked down, and assembled at the Bordeaux assembling plant of one American manufacturer. Italy furnished 190 of the remaining cars, Belgium 75, England 20, and 12 were imported from other countries.

French passenger car exports during the first five months of 1922 show a considerable increase over the same period in the previous year, 5,295 having been exported at a total value of 263,979,000 francs. Thirty per cent of the above number were exported during the month of May. This rapid extension of the manufacture of low-priced cars, with economical cost of operation, has been responsible for the increase in exports. Motor truck exports, including tractors, for the five months totaled 2,496 valued at 135,590,000 francs.

How Dealers Find New Prospects

It Is, of Course, Essential That New Names Be Constantly Added to the Prospect List to Keep Up a Steady Increase in Sales—Interesting Ideas Employed by Several Western Dealers to Attract New Sales "Raw Material"

By C. A. Goddard

In order to keep new sales "raw material" pouring into the sales hopper all the time, the Holley Motor Sales, Inc.—one of the firms that brought the Los Angeles sales of a certain make of car up to a record-breaking point last spring—uses every possible plan to secure new prospects.

One of these plans is that of interesting owners of old cars in an exchange proposition. Each Holley salesman has with him a number of forms, printed on cards the size and weight of post-cards. These read as shown in the illustration.

As the salesman sees cars that show signs of much wear, he slips one of the forms into that car. The owner finds it when he comes back, and the results show that the form is read. A number of prospects have come to the agency with the car—which bears the salesman's name—and have asked: "What will you allow me for that old car out there at the curb?"

Thus the salesman gets a chance to talk to many who might not otherwise come within "range." That plan has proved to be well worth while from the viewpoint of direct results, as well as from the viewpoint of publicity.

On Saturday, the curbs of a western city are lined with at least 500 machines. These are mostly motors of farmers who are in the city for the week-end shopping and who, in spite of the claim that the motor has in some places removed some of the Saturday trade congestion, nevertheless lay off work on that day so as to be in town while the stores are open.

This means a great bunch of curb-stone prospects for the dealers of the town.

Each Saturday one accessories department runs a spe-



Cards Dropped in Cars Standing at Curb Serve as Reminders.

cial price on some article or kit; many times it is especially selected to interest Ford owners. This offer, along with other items, is printed on a circular and the circulars are not only mailed to townspeople in advance, but placed in the machines that line the curbing.

This practice has led to a considerable business on merchandise that is shown at the same time that the prospects look at the special.

Window displays help along the

sales secured from the circular. Each week-end there is in the center of the window a display featuring the special for the week. While about this special will be other items, the center is given to the special itself—either by some showy background or by placing the special on a platform or pedestal.

One garage specializes on three popular makes of cars. Each one of the outside men carries a supply of cards explaining the advantage to a car owner in patronizing a shop that specializes on that particular car. These cards are dropped into the cars of the three makes and they serve as reminders.

When a car is found standing along the curb without a theft prevention device, such as one agency features, the owner is reminded of that device. On returning to his car he sees a little tag hanging to the wheel which reads:

You can feel safe in leaving your car provided you lock it against theft with the K..... W..... Lock. Let us explain its guarantee.

Dillson Auto Supply Co.
561 South Grant.

For several years, a soft drink "bar" in one of the hot cities of the Imperial Valley of California has been giving free tickets, good for a drink of root beer, to people outside the town—just to get them to come in to try the "bar's" root beer. The soft-drink dispenser knows from experience that it is a safe investment. He has found that a man "cashing" a ticket will not come alone as a rule, nor drink but the one free drink. It has helped him to develop a wonderful business.

A local garage-man, familiar with the operation of the plan, last year approached the root-beer man and offered

A Liberal Allowance

Will be Made on
Your Car in Exchange for a 1922 Improved Model



Holley Motor Sales, Inc.

Authorized Chevrolet Dealers

6025 Pasadena Ave.
Phone Garv. 819
Los Angeles

222 E. Colorado Blvd.
Phone Garv. 1062
Eagle Rock

"490" Touring, \$675 Delivered

Easy Terms Arranged

"SERVICE WITH A SMILE"

Reproduction of One of Cards Carried by Holley Salesmen.

The Law, The Facts and The Garage

Things Had Been Going Along in Good Shape for Dealer Brown, but the Course of Business Cannot Always "Run Smoothly" and So Dealer Brown Finds It Necessary Again to Consult the Law—This Time It's Warranties

By A. F. McCarty

For some weeks the course of trade and commerce in the Brown garage had run on smoothly enough, and Elwood Brown had met no new adventure in the realms of law. Then, one day, Nelson climbed the short flight of stairs to Brown's desk, a trifle out of breath.

"Mr. Brown," he began, looking about him to make sure that no listeners were near, "a matter has come up that will require your attention. A few weeks ago I sold one of those 'Under-the-Hood' electric heaters to a man named Gibbons. I recall that at the time he examined it closely and noticing that the insulation was off the wiring near the connection, called my attention to the defect.

"I cut off the wire and made a new connection, which seemed to be all right, and delivered it to this Gibbons. Gibbons seems to have had no trouble with it, but later he sold his car and then sold the heater to an acquaintance living nearby, named Elsey Perkins. Perkins, it seems, used the heater in his garage, having it connected with a 'hot' wire, carrying the full voltage of the city circuits.

"Well, Perkins claims that the insulation was off that wire, that in setting the outfit under the hood one night he got a bad shock which knocked him down and sent him to a hospital where he is now, and he's suing Gibbons for damages. Gibbons is downstairs at this minute, demanding that we defend the lawsuit!"

"Some more warranty stuff, eh?" said Brown. "And for personal injury at that. Well, send Gibbons up here and I'll talk with him."

When Gibbons reached the dealer's office on the balcony, Brown had had time to think. He let Gibbons tell the story again and paid careful attention. Gibbons based his claim and demand that the store defend the suit on what he called the implied warranty that the heater was in good order for use.

"Did you have any trouble with it yourself?" asked Brown, quickly.

"No, I'll have to admit that I

didn't," replied Gibbons. "I used it some time before disposing of the car, too."

"Well, I can't say just now what we'll do about this, Mr. Gibbons," said the automobile supply dealer. "It is a trifle sudden and a matter on which I am ignorant, but I'll see my lawyer and let you know right away."

Before consulting a lawyer, how-

Play Straight for the Hole.

The motto of the best golfer I ever played with was, "Always play straight for the hole." Had he been afraid in the early stages to take any chances whatsoever, he would have remained only a mediocre player. It is the same in the game of business, in the game of life, the game of getting on in the world; the timid, shrinking, backboneless specimens never get far. They will go out of their way as far as need be to avoid having to negotiate a hazard.—B. C. Forbes.

ever, Brown went to the hospital and had a talk with the man Perkins. In the course of that conversation, Perkins admitted that he had noticed the defect in the insulation the first time he connected it up; that he went on using the device without the idea occurring to him that he might get a shock. Gibbons had not told him about the defect—he discovered it for himself, and he made no effort at any time to repair it or have it repaired.

Brown went from the hospital to the office of George Updyke, his lawyer, and laid all the facts before that gentleman.

"This raises some interesting questions," said Updyke. "In the first place, there is the question whether, in any event, there is any responsibility to Perkins direct, and that we can answer in the negative.

"A warranty, if there was one, real or implied, such as to make you liable on it, is a personal thing, applying only to the person with whom you dealt. You could not be liable to Perkins, therefore, because you did not deal with him. And if you owe Perkins no obligation, real or implied, it would

seem that you ought not to be obliged to defend his suit. If Gibbons should lose in the suit and have to pay Perkins damages, you might then be liable to Gibbons for that loss, and, therefore, might as well have defended the suit in the first place.

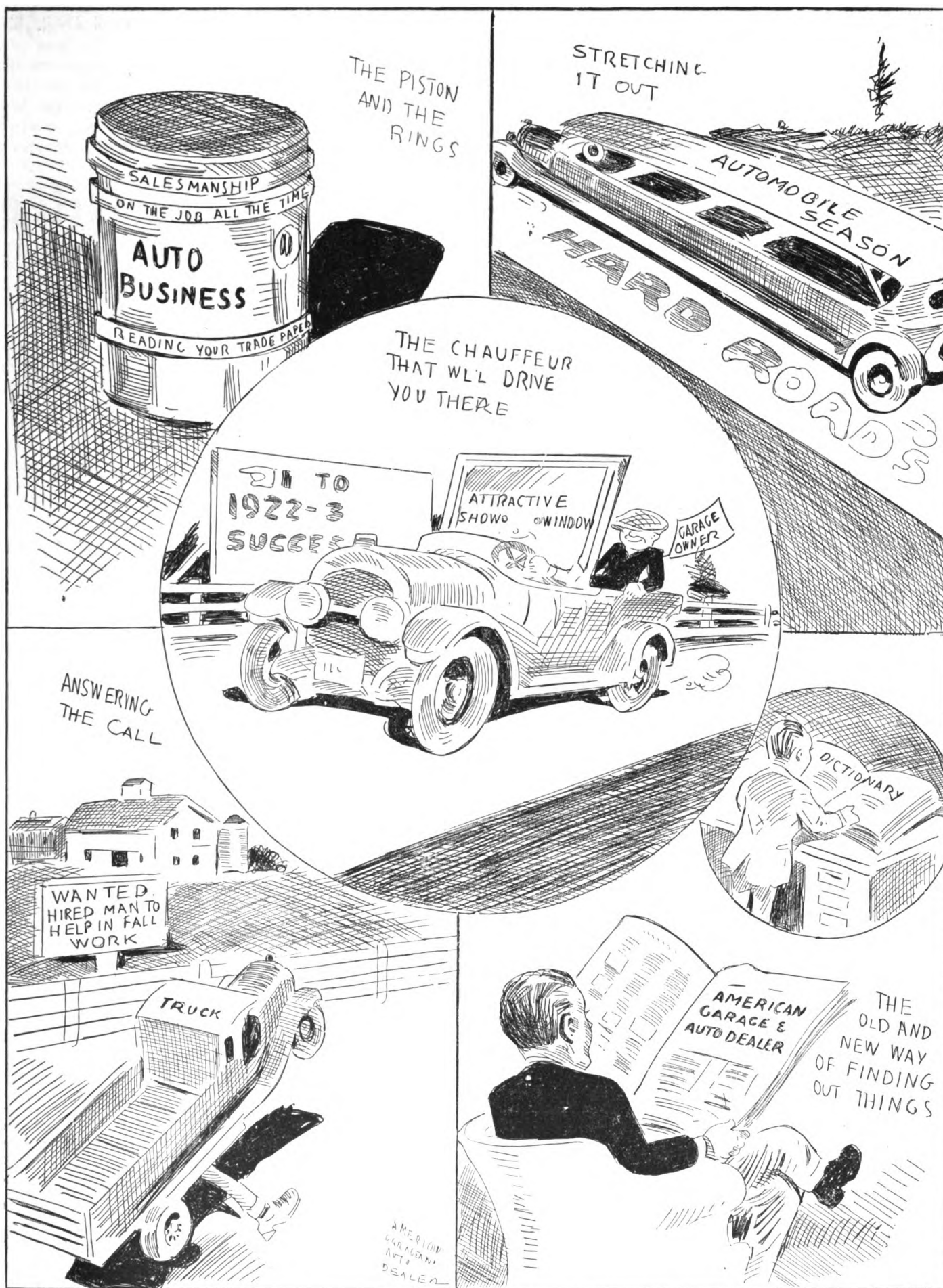
"Now, let's see. As to this warranty business, there is an implied warranty on everything you sell that it is reasonably adapted for its intended purpose and is reasonably safe.

"In this case your salesman undertook to repair a defect and turned the article over as in good order, thereby warranting it as in good order, but that warranty does not extend for any given period of time, does not say that the thing won't again get out of order, and does not protect the second purchaser, like Perkins. Further, Perkins assumed whatever risk there was and he has no case against anybody—he ought to have had the wire fixed when he noticed the defect."

"But suppose that Gibbons, while still owning and using the heater and without knowledge that the insulation had ever been out of order or repaired, had suffered the same shock and consequences. Would we be liable?" asked Brown.

"If just as you state it, probably you would be liable. But only for the money loss—that is, for the lessened value of the thing—as a general rule. It is seldom that recovery can be had for personal injury, for positive neglect on the part of the merchant must be proved. But such facts would hardly be possible unless you also were in ignorance, and warranty would not be implied for a hidden defect except by the manufacturer.

"If the defect is latent—that is not visible—and neither party knows of it, the only warranty implied is reasonable fitness for the intended use. And there is never a warranty implied in the case of a visible defect. Of course, if the dealer knows of a defect, but conceals it, that is negligence, as well as breach of general warranty of fitness for use. He may be, and gener-



ally would be, liable for all consequences.

"You see this case has nothing whatever to do with express warranties—that is, it does not hinge at all on anything said at the time of the sale. And I conclude, from all the facts, that there is no implied warranty to

render you liable to anyone. We'll just tell Gibbons that, while we have no lake here, we have a nice river he can jump into."

Gibbons didn't jump into the river, but he had to defend his own lawsuit. The jury found Perkins guilty of contributory negligence in continuing to

use the heater with worn insulation while getting current from a high voltage source and he lost the case. Of course, Gibbons had no claim left and the incident was over, but the facts served to fix in Brown's mind the rules of law relating to implied warranty better than the reading of volumes.

Five Dollars Capital and a Big Idea

People Often Talk About Doing Business "On a Shoe String"—Here Is One Man Who Started with a Capital of Only Five Dollars and Now Owns 75 Per Cent of \$3,000,000 Capital with Which His Company Is Incorporated

By Mrs. Estella M. Place

When George Pepperdine was a boy his home was on a farm in south-eastern Kansas. It was there that he got his first insight into business principles. When quite small, he made and operated a chain of rabbit traps, and the rabbits caught he dressed and sold in the markets.

It was this chain of traps that taught him the law of averages. He learned that it was the average per trap that made the returns count up—that, with a chain of traps, results were far better in proportion to the amount of effort expended.

George also got a large share of his

These lessons all bore fruit in later years.

In the year 1909, when he was 22 years old, George was employed as a bookkeeper for an automobile tire firm in Kansas City. It was while working there that he conceived the idea of an automobile accessory mail order business and of going into business on his own account.

He foresaw the growth of the automobile industry. Big fortunes were made, he knew, by knowing not only what people want in the present but what they are going to want and so anticipating their future needs. He felt sure that a mail order automobile accessory business could be built up to be exceedingly profitable—but he had only five dollars that he could use as capital with which to start it.

Not at all daunted, he went to a friend who was a printer and arranged to have his first catalogs printed on credit. The catalog consisted of two small pages. His five dollars he saved for postage with which to mail them out.

Orders began to come in at once and, through his acquaintance with the wholesale houses, he bought goods to fill them at dealers' prices. The returns on his venture were most gratifying. His profits that first month were \$100.

With this encouragement, he gave up bookkeeping and went into business for himself. He rented a space 8 feet by 12 feet, with a window in the front of a garage, for \$20 a month. By the time he had bought a desk, a show-case and other furnishings, he had exhausted all his capital. A wholesale house furnished him a consignment of goods sufficient to fill his show-case and decorate his window, the goods to be paid for from weekly

sales. He now put out a new catalog—a little more pretentious than the first.

By the end of the first year his sales had amounted to \$12,000. The following year they were over \$22,000. The third year they exceeded \$46,000. At the end of this year he had a chance to buy out an automobile accessory house on such terms that it could be paid for later from the sales made.

In the year 1915 Pepperdine was ordered to Denver for his health. In looking over the city he was convinced that an automobile accessory house would do well there, so he decided to



"The Original Man Who Can Vision the Future Has the Best Chance," Says George Pepperdine.

early business education from the mail order catalogs, of which he was an inveterate student. He learned of goods and their comparative values, and of the appeal that the mail order catalog makes to the buying public.



Mrs. Geo. Pepperdine, Vice-Pres., Western Auto Supply Co., Works Every Day in the Company's Office.

open a branch store. This he did and the business grew, from the first, beyond his expectations.

The next year Pepperdine went on to Los Angeles. He saw that the good roads, the scenery and the climate,

were all conducive to making the automobile business a leading industry. The profits from his business already established enabled him to open another automobile accessory house in that city.

This policy of expansion was followed for the next four years. The profits of the business were used to establish new stores until, by the year 1920, Pepperdine owned 75 per cent of the capital in 15 automobile accessory stores, the sales of which amounted to more than \$4,000,000 annually.

This year all the stores in the Western states were incorporated as the Western Auto Supply Co., with a capital of \$3,000,000. Since that time new branch houses have been opened until now there are 40, all doing a profitable business. When Pepperdine was asked where he secured the managers for these branch stores he replied:

"They have all been selected from men who have been in our employ for some time. They have been under our observation so long that we know they are fitted, by character and ability, to take charge of the business. It is to these men that we attribute much of our success."

This story is not complete without telling the part Mrs. Pepperdine has played in the business.

"My wife has worked right with me from the first," says Pepperdine. "In the beginning, when we had very little capital, it required careful financing to keep going. I found that my wife's intuitive knowledge of ways and means was more dependable than my deliberate judgment—and she helped me out of many a tight place. And there have been tight places; I have had my backsets."

Mrs. Pepperdine is vice-president of the Western Auto Supply Co., and every day she works side by side with her husband in the office. She also owns a very sizable block of the stock of the company.

The policy of Pepperdine has always been to satisfy the customer and to give a dollar's worth of goods for every dollar received. He says that money taken in does not belong to the business until it has given an equivalent for it. When asked what advice he would give to a young man just starting out in business, he replied:

"A young man should get into the business he likes best just as soon as he can. Then he should work with all

his might. Men fail in business because they do not do with their might what they start out to do.

"If the idea or plan of business is new, so much the better. If the young man has faith in his plan, he should stick to it and see it through.

"The original man who can vision the future has the best chance. Above all things, he should be honest and give a dollar's worth of service for every dollar received."

HOW DEALERS FIND NEW PROSPECTS

(Concluded from page 13)

to print the tickets for him—provided the root-beer man would allow the garage a small advertisement on the reverse side. To this the soft-drink man agreed.

Now the tickets bear a showy advertisement of the root-beer on the face and on the back in light type in the center, this notice:

While you are cashing this ticket let us give your car attention.

Holliday Garage,
Corner Mercer and Main.

These tickets are freely distributed at fairs, sales and other places where there are many people gathered.

Another system of co-operation was between a department store and a garage that has parking space to rent. Any customer of the store can secure a ticket that entitles the holder to two hours of free parking on the garage's lot. Any time over that costs the holder 15 cents per hour. As the department store is not open at the rush period of the evening, this plan brings many new people in during dull times and does not interfere with the busy traffic.

As any customers secured at the curbing are new, plans that enable the dealer or garage to get them add just that much velvet.

CAN STRICTLY CASH BUSINESS SUCCEED?

(Concluded from page 10)

sheet carries the cost as well as the selling price, it serves as a daily record of the gross profits as well as of the sales. The expenses are classified in an expense book that is purchased, ready ruled and bound, from a stationery store.

Since the business is done on a cash basis, this book shows the condition of the business at all times. A great deal of work is saved, and it is always possible to tell exactly where the business

stands. A stock inventory, plus the data in the book, is all that is needed.

A feature of Seaman's business policy that has not been touched upon, but which is important and closely related to both business building and accounting, is that of keeping down the overhead. He makes it a practice to buy nothing in the way of equipment or increased facilities of any kind until he really needs it and has the money with which to pay for it. This makes it easier to keep the cash book straight because, when no red figures have to be entered on the balance side, there is less figuring to do.

Having his garage always crowded—even overflowing with cars—also has a psychological effect upon customers. It makes the place look busy and prosperous. It indicates that others have a great deal of confidence in the concern. If he had built a garage twice the size he did, it not only would have cost more money, thus increasing his overhead, but it would not have seemed so busy. It probably would have cost more money to get the business needed to fill it.

He believes in buying everything he needs, and that he has the money to buy, and no more. When a man does business along these lines, he rarely ever experiences any difficulties in finding someone to advance the money for additional buildings when such an expansion becomes necessary and it doesn't seem wise to wait until the business itself will provide the cash.

Active Belgian Market for Motor Vehicles and Accessories.

The number of motor vehicles in the Province of Antwerp has steadily increased during the past year, states Vice Consul Smith, in a report to the U. S. Department of Commerce. The present registration of 4,800 passenger cars and trucks is 60 per cent over that of a year ago, and the 2,800 motorcycles show an increase of 250 per cent.

Although there has been little demand in the past for modern garage equipment, the writer believes that American labor-saving devices should find a ready market in Belgium in the future. "There is an active demand for all kinds of accessories, which American manufacturers should meet by giving their agencies to independent accessory dealers rather than to garage owners or distributors who, as a rule, only sell to their old customers and do not cover the assigned territory."

Current Comments and Observations

By The Editor

We Continue to Resume.

Business conditions, although handicapped by the car shortage, continue to improve gradually. There has been a general advance following the seasonal lull in different trades and setbacks in some industries on account of strikes.

Activities in various quarters have expanded. This is seen in the increasing sales of the mail-order houses and chain stores, growing bank clearings, increasing steel orders and heavier car loadings. These are salient points of a situation which, even if irregular and by no means satisfactory, is clearly one of favorable promise.

In the automobile industry there was a car and truck production of something over 206,000 in September, as against 157,400 in September of last year.

Reports from the field indicate that October business will be good although, as usual, it will be considerably under that of the summer months. Prospects for Christmas trade are said to be good in the South, while in other sections it is not considered a big factor.

It's been a good year in the automobile field, according to all figures, and authorities believe that next year will be equally as good.

Of course, the more cars in use, the greater the opportunity of the garageman for repairwork and the sale of tires and accessories.

* * * *

"Make Money," Not "Get" It.

Not many years ago, we often heard the query: "How much are you making?" And recently we have noticed a change in the wording of this phrase to "How much are you getting?"

There is a heap of difference between making and getting. Time was when craftsmen worked at their trades, not to "get money" but to "make money." They took pleasure in turning out good work—work that would pass detailed inspection and tests. They were proud of their skill to do things that would "make money" for themselves.

But, in recent years, there has been a

distinct tendency to "get money" and pride in workmanship was lost in this desire to "get money." This applies not only to the workingman but to the business man as well.

The spirit of service which is a fundamental of "making money" was lost sight of by those who believed in "getting the money." But no permanent success can be built upon the policy of "getting money"

KEEP MOVING.

In every walk of life, especially in the business world, there is no place of promise for the man or woman who has stopped growing. Modern competition has resulted in this state of things. You must either move along or drop out completely.

Progress cannot wait for you. This is why the man of vision, the man who seizes the chances, or the fellow who makes chances is the one who is valued above all others and placed in command. The people under him will catch his enthusiasm and each will do his part to make their leader step along more lively. It is the order of things in modern business. Move along is the ever-ready command.—Comfort Chat.

or "getting" anything else without service. Alexander the Great tried it, Napoleon thought it could be done and, in our time, Wm. Hohenzollern attempted it.

Our most successful business institutions are founded upon service, and their policy of "making money," of giving real value for money received rather than of "getting money," of giving less value than the money received, has enabled them to enjoy increasing business. People will buy and pay more at those establishments, simply because of the confidence that has been established through their policy of "making money."

There are many garages operated upon the "getting the money" plan, but they can not continue long in business for their fundamental policy is wrong—and fundamentals cannot be successfully ignored.

With the "return to normalcy" we are seeing that many of the theories followed

in the past few years were destructive and cannot endure. The "getting" of money is one of them.

The main object of business is to "make money"—and it can be done. "To make" is constructive but "to get" is not.

* * * *

What Have You?

"How much work do you do on the lathe? Does it bring you in any money?" asked an expert machinist of a garageman, upon observing a lathe in a corner of the garage shop.

"Why, I use it quite a little," the garageman replied, "but I do not know how much money I really do make as a result of having it."

That started the garageman thinking and he began keeping a record of what work was done on the lathe. Greatly to his surprise, the lathe was making much more money for him than he had any idea of. He was so impressed with the showing made that he began to see possibilities in extending its use.

He called his friend, the expert mechanic, to advise him as to other lathe equipment and suggestions as to the different kinds of work that could be done on it. Now that lathe is one of the garageman's important revenue producers—and he had never suspected that it possessed real money-making possibilities.

Proper tools and equipment always make money when one knows how they should be used. It's easy enough to find out about things. We are much like the old farmer who, when approached by the subscription solicitor for a farm paper, answered the agent's arguments as to the information he could obtain to do better farming with: "Well, I ain't farming the best I know how now, so I don't need any paper."

There are some business men who have the same kind of opinion as to their ability but they are not among the number who are classed as "successful." And that holds true in any line of work. The seeker after information today is the successful man of tomorrow.

Some Business-Stimulating Ideas

Often It Is an Unusual Display Window or It May Be Some Particularly Attractive Item of Service or Advertising with "a Punch"—Read Here How Other Dealers and Garagemen Are Increasing Sales by Such Means

H. Martinsen, garageman of the little city of Wanamingo, Minn., has evolved an excellent method of having a well-lighted room for car parts at the front of his building, conveniently near the main entrance, without letting this room shut off the light from the storage and workrooms.

The framework of the supply room is covered only with wire netting, instead of having solid walls. This method lets the light through this room to the rooms beyond, yet enables the owner to safeguard the supplies, large and small, which are kept inside. Also he is able, when any part is called for, to find it easily instead of spending valuable time peering about in an ill-lighted back or inside room searching for what may be wanted.

The well-lighted, neatly-kept office room, with its up-to-date fixtures, is on the opposite side of the main entrance.

Uses Club Plan Card.


In order to keep a stream of work coming through at all times, and to build up a clientele of steady patrons, the M. & G. Garage & Service Station, 6304 Pasadena Ave., Los Angeles, issues a club plan card to cover car-washing, polishing, greasing, tightening of frame bolts, battery testing, radiator draining and refilling.

A monthly service of this sort costs the car-owner \$3.50 per month and he contracts for a year. In doing so, he pays for

the first and last month of the period of service. Thus the garage always has one month's fee in advance as a guaranty of good faith on the part of the patron. The membership card is a punch card affair and is punched as service is given.

Some months will see the service rendered run close to cost but, with a year's

BUMPER TALKS



What's In A Name?

Ask most men this question and they'll answer "Nothing." But you just follow them around when they do their shopping and see what they buy. You'll find that they ask for Manhattan Shirts, Van Heusen Collars, Boston or Paris Garters, and, if they are doing a little purchasing for the wife, will probably wind up with some Del Monte peaches and a box or two of Nabiscos. They ask for these brands because they are familiar with them—because the brand names are synonymous with quality. It's the same way with our STEWART BUMPER. Motorists who are seeking a classy looking bumper for their car and want a bumper that gives 100 per cent protection as well, are insisting on STEWART'S. Drop in and see them.

Bill

P. S. When you can get a set of brand new Stewart's in exchange for your old worn out bumpers, you have made a good swap. Ask us about our exchange proposition.

The Stewart BUMPER SHOP
1355 So. Flower St.

This Is Easily Read and Plays Up Line Handled.

contract of steady monthly visits, the year shows a desirable profit to the concern.

One of the most interesting advertisers in Los Angeles automobile columns is the Stewart Bumper Shop, of 1355 South Flower St. This shop uses single-column space and runs each insertion under an illustration of a pair of butting billy goats. Above the illustration is the title that runs

WHO AM I?

Seems as though I'm getting people interested in bumpers that never thought of them before. Folks are even saying, "Who is that guy, Bill, that's making such a fuss about bumpers? What does he know about them, anyhow?" That's easy. I'm just an ordinary every-day sort of guy that tries to put two and two together and see what it makes. And I have enough common sense to know that our bumpers really do protect a car. If they didn't the insurance companies wouldn't recommend them. Drive in and look at them and then ask your insurance man how much of your premium he will refund if you buy. He will say 10 per cent to 12½ per cent. See if I'm right.

Bill

P. S.—We take any make of bumper in exchange for our new ones, no matter what condition they're in.

Another of "Bill's" Snappy Bumper Talks.

over all the advertisements, "Bumper Talks." Each is signed "Bill." They are all easily read and play up the line handled.

In order to reach owners of old bumpers who might be interested in turning them in for new ones the third advertisement shown was run recently.

Profitable Pointers for Garage Dealers.

"The best that we can do for one another is to exchange our thoughts freely; and that, after all, is about all."—Froude.

The garage dealer does not weigh his business entirely in terms of weekly results. Unlike the insurance salesman or the furniture dealer, he is not so much interested in reviewing a "good week" as he is a series of "good days." The garage business is a day-to-day business, in which every hour counts in the way of profiting by jobs. Therefore, everything the dealer can do to promote business response is worth while in strengthening the profit and establishment of his place. In the interests of such results, a few plans which the garage owner can study and adapt are explained in representation of what other alert dealers have accomplished.

For illustration, a dealer in the East arranged an attractive display in which he included a specimen of nearly all types of service offered—auxiliary articles sold, ad-

ALADDIN AND HIS LAMP.

The exchanging of new goods for old is not such an original idea as I thought it was. My attention has been called to the fact that a certain foreigner, name of Aladdin, way back in the dark ages when they needed 'em, used to swap new lamps for old ones. Don't know any of the details of his business but I'll bet his new lamps weren't a bit shinier or more serviceable than the new bumpers we are exchanging for old ones. And our proposition is liberal too. Don't know if Aladdin sold new lamps or not, but we do sell new bumpers for unequipped cars.

Bill

P. S.—I owe Fred Wagner of the Express a nice, cold Coca-Cola for the idea in this "Bumper Talk." Wonder if he will claim it?

This Ad Interests Owners of Old Bumpers.

justments, lubricants, etc. In the center of the window he arranged a unique placard which consisted of a large wishbone painted on a card. The original wishbone was placed in the center of the display, while beneath it the following words appeared in invitation to the trade:

**Everything in the Way of
Automobile Service That
You Could Wish For.**

To aid the punctual collection of bills, one dealer who has made a study of this feature of his business always includes a return envelope addressed to his store—but not the usual envelope. The one he employs is of the regular size, but possesses a bright orange border and is printed on a blue tint. At other times he uses other envelopes but of some color or composition that makes them “stand out.”

His theory—which seems to have worked out as practical—is that an impressive envelope of this nature is never discarded and generally makes itself seen among other papers on a desk, serving by its very presence as a good collection reminder.

A good business-getting pointer which is worth the study of ambitious garage dealers is illustrated in the sales letter following. This letter is built around some information of unusual interest—and is of the type which will win adoption. The dealer who uses this believes that it has greater value than mere descriptions or announcements.

Dear Sir:

They tell of a cave in the Pantheon where a guide, by merely flapping his coat, can make a noise equal to the report of a 12-pound cannon! In a lesser degree, this can be accomplished in the Mammoth cave of Kentucky.

Over in Finland there is a cave bearing the startling name of “Smellin” where a scream will last nearly a half hour, while Pliny tells us of a cave in Dalmatia into which a stone tossed will raise a perfect storm.

Conditions producing such echoes are uncommon. So are the conditions surrounding the production of service echoes—for there are echoes in the commercial as well as in the physical world.

Most folks know the Mammoth cave is a wonderful place, even though they haven't been there. Tourists realize that it adds to their prestige to say: “I've been to the Mammoth cave.”

Many folks have realized that it also adds to their prestige, as well as their satisfaction, to have Jackson take care of their repairs and adjustments. For, like the echoes of Mammoth cave, these have lasting and dependable qualities.

Our experience in serving the public has been highly pleasing. Our customers are well satisfied. We would like to add your patronage to the “Echo” of full satisfaction.

Sincerely yours,

In the plan for advertising, one garage dealer follows the firm rule of never issuing any personal advertising material unless it is of a useful nature. For example, blotters, calendars, note-books and other souvenirs are distributed by him, but never cards or printed slips that do not possess

some useful value. He believes this to be a pointer worth following as it perpetuates the length of the advertisement—and he looks upon advertising as a supplementary business measure that requires frequent presentation to be of proper value.

Another business pointer respected by one dealer is in having it understood in his office that no one will ever answer any telephone inquiries with the words, “Mr. Williams is out.” He always informs his office where he is going and encourages them to advise those who might inquire.

He believes that if customers call up frequently and always receive the same answer of absence, they may become possessed of the fact that “he is never there”—when to the contrary he desires them to know that all business has his personal interest and attention—factors responsible for its success.

A garage and gasoline dealer in Connecticut offers a discount to all trade from members of company clubs—employees' organizations. To save all expense of advertising and printing, he had the word passed through the club's leaders. To take advantage of his offer the member needs only to show his club membership card. By confining it to employees' clubs exclusively, he has won a good response.

An ambitious garageman in Pennsylvania plans to offer a “Christmas card” that can be purchased from him and used as a gift. It will entitle the bearer to a certain number of gallons of “gas” free and the giver can purchase as large or as small an amount as desired.

Desirous of keeping on a cash basis as much as possible, another garage proprietor has on hand at all times a supply of blank checks for different banks in his city. When a “job” is called for and the owner states he will “send a check,” the dealer diplomatically reminds him of his supply which, in numerous cases, is taken advantage of.

Little pointers, such as these, when practiced, add to a garageman's profit and continued sound growth.

Augos Service Station.

“Augos Service Station.” This queerly-worded sign greets the automobile traveler, as he wends his way along route 131, at Kennett Square, Pa. Here the American United Gas & Oil Service Station has been opened to the public, after an active campaign for subscribers to this service and others also.

The company has its own oil and gas plant near Philadelphia, Pa., and has been building these service stations to answer an ever-increasing demand for just such things along the main traveled highways. They have been built by local contractors, and present a very neat appearance from any angle.

This station, as shown, was put up in a short time, built of native stone with shingle roof. Inside it has toilet accommodations, and a wash-room for use of patrons en route. The gasoline dispenser is of a new type, and is stored in a neat stone receptacle in front of the building, so that when closed it does not detract in any way from the general appearance of the rest of the surroundings. This dispenser works under pressure and does away with all arm work, the simple pressure of a lever placing the gasoline in the tank of a machine.

There are flower beds along the front and boxes in the window, and this helps the appearance wonderfully.

This company has been selling bonds for some time, with a coupon system by which the subscriber can go to the home bank each month and clip a coupon, his share of the earnings made from the daily sales of all the service stations, thus getting a good return on money invested. This gives the individual bond-holder a real and genuine interest in the use of oil and gasoline from

(Please Turn to Page 30.)



Note the Neat and Attractive Appearance Given the Gasoline Dispenser by Its Stone Receptacle Which Harmonizes Perfectly with the Building Housing the Augos Service Station.

When Tire Retreading Is to Be Done

It Is Essential That the Repairman Select Only Good Carcasses for the Retreads—Tires That Have Been Underinflated and Run in That Condition Should Never Be Retreaded—Procedure to Be Used Described and Illustrated

By H. J. White and Lowell R. Butcher

Instructors in Automobile Trade School, Des Moines University

Retreading can hardly be classed as a tire repair. It is, in fact, more of a rebuilding operation. A sound carcass is equipped with a new gum covering, giving in many cases an increased mileage equal to that already had by the tire.

It is essential that the repairman select only good carcasses for retreads. Otherwise, the retreaded tire may fail from no fault of the workmanship in rebuilding, but from a damaged or broken foundation. Tires that have been underinflated and run in that condition should never be retreaded. In almost all cases such tires are damaged by tread separation or rim cuts.

Neither is it good policy to attempt a retread on a tire that has been damaged by a large blowout. Such a damage may, although skillfully repaired, make a bulky

this true if the dry-cure method of vulcanization is used.

Before starting the cutting down, the tread should be evenly marked with the tread gage. The tread is usually taken off to the 45-degree angle of the tire, although this will vary somewhat with the condition of the rubber. If in good condition the strip taken off is narrower, and a neater job of retreading may be done if it is possible to keep the strip removed comparatively narrow.

Following the marks made by the tread gage, cut the tread down to the outer ply of fabric. A large notched knife is used for this, and considerable skill is necessary to make the cut just deep enough without injuring the carcass of the tire. The knife will cut cleaner and more freely if it is dipped in water from time to time.

A starting place for the removal of the tread is made by cutting across the blocked-out strip. The tread is removed by pulling back and using a sharp screw-driver. Usually the tread can be taken off in one strip, but sometimes it adheres so tightly that it must be removed in several narrow ribbons. All traces of the breaker strip must be removed, either with the tread or on the buffing wheel.

Buffing must be very thorough for retreading, Fig. 1. The carcass must be cleaned in order to provide a firm foundation for the new material. The buffing is carried down on the sidewall, giving the new gum a foothold and making a better union. As far as possible, bevel the sidewall to the contour of the tire.

After the tire has been cut down, it should be re-examined for damages. It is sometimes impossible to detect all damages before the tread is removed and this second examination will detect any defects which might make the retread worthless. Be sure that the carcass is thoroughly dry. If it is damp, dry it by placing in the sectional mold before attempting to build up. A slight separation of carcass or loose cords should be cemented into place at this time.

Wash the tire with high-test solvent to remove all dirt, grease or foreign matter, and allow the tire to dry until all traces of the solvent have disappeared. Building-up is now started by applying a coat of rather thin cement which will penetrate much better than a thicker coat. Three or four coats of cement are applied, depending upon the carcass which is being retreaded. Cords will usually take more cement than fabric carcasses.

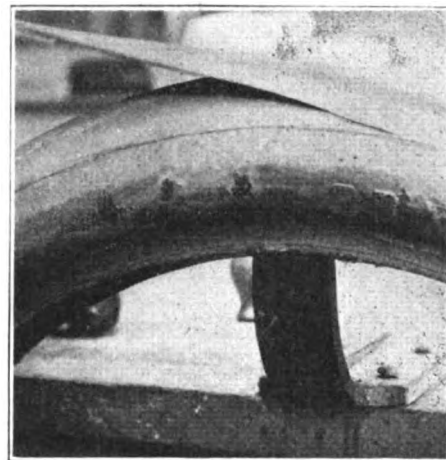


Fig. 2. Applying Cushion Stock.

The last two or three coats are applied somewhat thicker and each coat allowed to dry until tacky before brushing on the next. Cement will dry in accordance with the temperature humidity of the air, but usually 35 to 50 minutes between coats is sufficient. The last coat is allowed to dry at least six hours—eight are better—before any gum is applied to the carcass. Be sure that the cemented tire is not hung in a draft. If the outer surface of the cement dries too rapidly, a crust is formed which prevents the thorough drying of the cement.

Any blockouts are now built up in the usual way. A layer of 1/16-inch thick cushion stock is applied to the crown of the tire. This is put on in the form of a strip that extends about the circumference of the tire and is wide enough to lap at least 1/4-

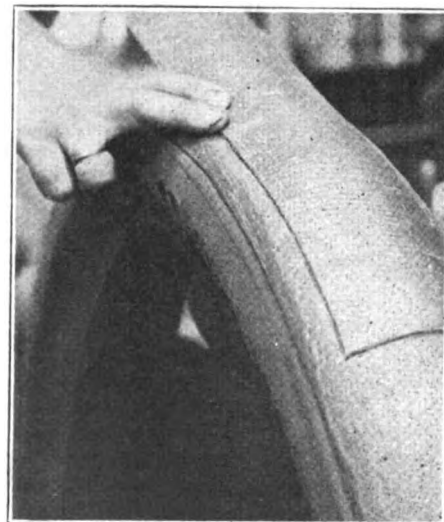


Fig. 3. Applying the Breaker Strip.

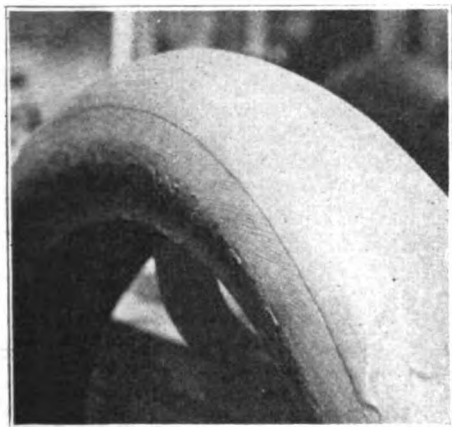


Fig. 1. Cut-Down, Buffed and Cemented For Retread.

place on the carcass that will create internal friction and lead to disastrous results. Remember that a retread should give practically the same mileage as a new tire. Figure the cost per mile on a retread and see that it compares favorably with a new tire. Only on such a basis can a repairman do retreading with benefit to himself and to his customers.

Small repairs, if needed, may be made to the carcass before retreading. Retreading gives a new wearing surface to the tire and no service can be had if the carcass is not strong enough to last for the life of the new tread.

Retreads may be made in a variety of ways. A good tread may be taken from another tire and used. Retread bands provide a quick means of placing a new tread, but perhaps the best job of retreading may be done when the tread is built up, piece by piece, from new material. Especially is

inch down on the buffer side-wall of the tire at each side, Fig. 2.

The cushion is rolled, stitched and perforated, taking care that all air bubbles are pressed out and that the gum makes good contact at all points. Clean the new gum with a rag moistened with high-test solvent before building up farther.

A strip of breaker stock is cut one inch

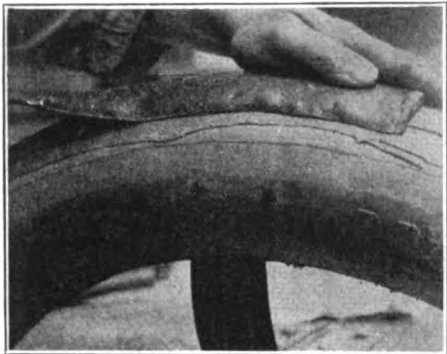


Fig. 4. Applying the Camel Back.

narrower than the cross-section of the tire, and long enough to extend about the circumference. This material is always cut at right angles and never at a bias. Apply this to the center of the tire, taking care that it is stretched tightly and applied straight, Fig. 3. The ends of the breaker meet in a line that is straight across the tire, and are allowed to lap $\frac{1}{4}$ -inch. Skive the lap to prevent a bulged place on the tire and roll, stitch and perforate, using the precautions mentioned concerning air bubbles. Clean again with high-test solvent.

Another layer of 1/16-inch cushion stock, extending $\frac{1}{4}$ -inch beyond the breaker at each side, is applied. This is handled in the usual way to insure good contact and cleansed with high-test solvent.

From now on the repair may vary according to the material used to complete the work. Square-shouldered camel back or tread gum may be used to complete the repair. Camel back is a prepared gum that comes in the correct thickness and shape for the tread. It may be purchased in

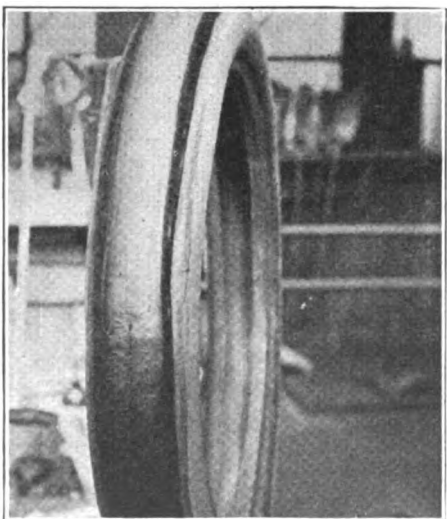


Fig. 6. A Retread Ready for Cure.

widths for any size tire, and forms a convenient means of applying the tread if the cut down section is not too wide.

If camel back is used, be sure that no dirt is on the surface that goes next to the tire. To be on the safe side, it is best to clean the gum with high-test solvent. Apply one end of the camel back to the tire and stretch a strip entirely around the tire, Fig. 4. It is not necessary to cut the strip from the spool until the entire circumference of the tire has been covered. Unroll the material as it is pressed to the tire.

Application of the camel back should be done very carefully. If not applied in the exact center of the tire, the gum will flow down unevenly during the cure and make a lop-sided retread. Stitch the camel back as it is applied. Rolling is first done with the hand roller, after which the gum is thoroughly perforated. The meeting point of the ends of the camel back is lapped and skived to the contour of the tread.

The tread roller is now brought into use, Fig. 5. Roll the center of the tread first, gradually increasing the pressure of the rolls. Roll the edges by shifting the tire

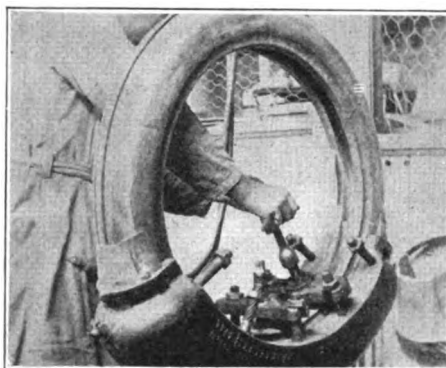


Fig. 7. Tightening Up Clamps on One-Third Circle Retread Mold.

to one side. Any air pockets that have escaped observation before may now be detected. Perforate these as they are found, for a small air pocket may cause the gum to blow badly during the cure.

If the tread strip is so wide that it is not possible to use camel back, the tread may be built up by using several layers of tread stock. The first strip is cut the same width as the widest strip of cushion stock used. This is stretched in applying so that it is about $\frac{1}{2}$ inch narrower than the cushion, allowing the tread gum to flow down to the edge of the cushion during the cure. Successive layers of tread gum are added until the tread is built up to the desired thickness. Each layer is narrower than the preceding one, thus keeping the contour of the tire.

All layers of the tread are cut, and the tread built up as a unit before it is applied to the tire. Rolling, stitching and perforating is done, followed by the use of the tread roller as before.

Fig. 6 shows the retread ready for cure. Cure is usually accomplished in the 1/3-circle mold, taking three hitches to the tire.

Sand bags are used in place of the air bag for inside pressure. The mold should be perfectly clean before using. Moisten it with a solution of castile soap, glycerine and water. This will prevent sticking and give a smooth, shiny appearance to the cured tread.

The pressure clamps should work freely so that a uniform pressure may be obtained.

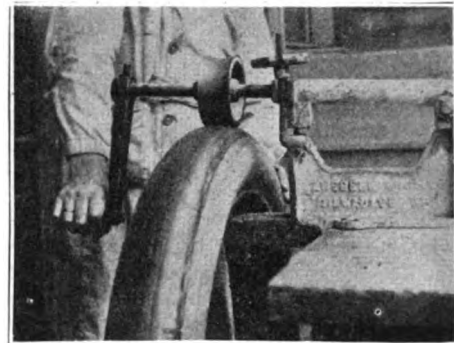


Fig. 5. Using the Tread Roller.

A pressure bar is used on the sand bag. This must be a third-circle bar or the pressure on the bag will not be uniform.

Great care must be used in placing the retread in the mold. The inside of the tire is sprinkled with soapstone and the sand bag placed. The pressure bar may be placed either before or after the tire is in the mold.

Be sure that the sand bag fits the inside of the tire. If it does not, pad as usual.

The pressure-bar screws on opposite sides of the mold must be level or a lop-sided cure may result. Pressure must be exactly in the center of the pressure bar for the same reason. The center clamp is put in place first and the screw drawn down. Put on the other two center clamps and tighten until some pressure is given to the bar. Place the two outer clamps and tighten. Now tighten all clamps evenly, beginning at the center and working out to the ends of the mold, Fig. 7.

The cure is started and, after 20 minutes' time, the clamps are again tightened, the rubber having started to flow and mold by this time. After the hitch has had sufficient time (Please Turn to Page 36.)

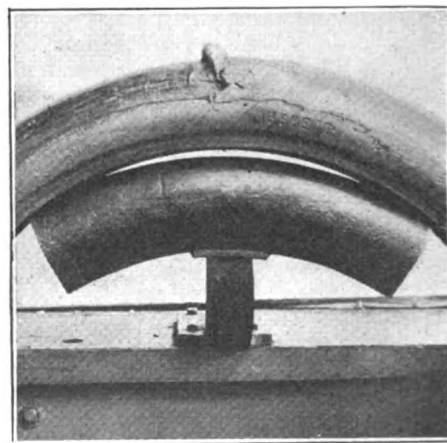


Fig. 8. Retread With One Hitch Cured.

Legal Rulings of Interest to Garagemen

New York Supreme Court Rules That the Consent of Neighboring Property Owners to Building of Garage, When Given Without Consideration, May Be Revoked—Decisions Rendered by Other Courts on Automotive Questions

By R. R. Rossing

Consent of Property Owners to Building of Garage.

The New York Supreme Court has ruled that the consent of neighboring property owners to the building of a garage, which was given without consideration, may be revoked at any time before being acted upon.—*Brennen v. Walsh*. Supreme Court of N. Y. 195 N. Y. Supp. 264.

Ordinance Prohibiting Garages Near Churches and Residences.

An ordinance of a town prohibiting the erection of a garage or group of garages, for more than five motor vehicles, on any lot situated within a radius of 200 feet of, or within any portion of a street between two intersecting streets, in which portion there exists a public school or a church, is held by the Supreme Court of New Jersey to be a reasonable regulation touching public health, safety, and general welfare, is within the scope of the police power of the town and is consequently valid.—*Schait v. Senior*, Building Inspector. Supreme Court of New Jersey. 117 Atlantic 517.

When Automobile Is Stored Under a Special Contract.

Under the Maine law, a common-law lien for storage exists where, after automobile repairs are completed, the party requesting the repairs, being without funds, left the automobile in the garage, promising to pay storage until he could settle for the repairs. since the rights of the parties were governed by this special contract.

Where a Holmes note, stipulating that an automobile sold to maker shall remain payee's property until paid for, is not recorded in the town clerk's office at maker's residence and is, therefore, invalid except as between the parties, payee may nevertheless, upon nonpayment, maintain replevin against a garageman who made repairs but has no lien either for storage or repairs.—*Crosby v. Hill*. Supreme Judicial Court of Maine. 117 Atlantic 585.

Motor Vehicle Dealer's Certificate of Registration.

Under Massachusetts St. 1909, c. 354, paragraph 1, as amended by Massachusetts St. 1915, c. 16, paragraph 1, defining a "dealer" in motor vehicles as one engaged principally in buying, selling, or exchanging such vehicles, or whose principal business is the renting thereof, one's business as a whole must be principally that of buying,

selling or exchanging motor vehicles, etc., and it is not sufficient that the business conducted by him at a garage has the required characteristics, if he also operates grocery and provision stores, and carries on a farm.

Where defendant, besides conducting a garage, where he carried on the business of buying, selling and renting motor vehicles, also conducted several grocery and provision stores, and carried on a farm, and spent little of his time at the garage, the court held that the jury was warranted in finding that he was not engaged principally in buying, selling, exchanging, or renting motor vehicles, so as to be entitled to a dealer's certificate of registration.—*Pierce v. Hutchinson*. Supreme Judicial Court of Mass. 136 Northeastern 261.

Dealer's Warranty of Automobile is Implied.

In the absence of an express warranty, the Alabama Supreme Court held that the law implies a warranty on the part of the seller of an automobile that it should be reasonably adapted to the uses for which it was made and sold; that it should be a reasonably good automobile, its class and price considered.—*Franklin Motor Car Co. v. S. L. Ratliff*. Supreme Court of Alabama. 92 Southern 449.

Builder Liable for Misrepresentations of Salesman.

An agent to solicit contracts for the purchase of automobiles had apparent authority to make representations as to horse power, hill-climbing ability, gasoline consumption, etc., which did not relate to workmanship, material, etc., covered by a written warranty, though he had no authority to make warranties beyond those contained in the contract.

In a suit to rescind the purchase of an automobile for fraud, findings that defendant's sales agent misrepresented the power that the car would develop, etc., and that plaintiff was thereby induced to purchase, were held by the Court of Civil Appeals of Texas to be sufficient to entitle plaintiff to judgment.—*O. B. Manes v. J. I. Case Threshing Machine Co.* Court of Civil Appeals of Texas. 241 Southwestern 757.

Receiver of Stolen Automobile Liable Under Federal Act.

In a prosecution under act of October 29, 1919, paragraph 4, making it a felony to receive a motor vehicle which is moving in interstate or foreign commerce, knowing the

vehicle to have been stolen, the court held that it is not essential to a conviction that the accused knew the automobile was moving in interstate commerce, but knowledge that the automobile had been stolen was sufficient.—*Katz v. United States*. U. S. Circuit Court of Appeals. 281 Federal 129.

Garage May be Built Where Stable or Barn is Prohibited.

As a covenant against the construction on the front 125 feet of a lot of any stable, barn, or privy uses only specific terms, the Supreme Court of Illinois has held that the rule of ejusdem generis cannot be invoked to extend it to a garage.

The court ruled that it is at least doubtful whether a restrictive covenant against the construction of any barn or stable on the front 125 feet of a lot includes a garage, and hence injunctive relief must be denied.—*Rose M. Labadie v. Everett Morris*. Supreme Court of Illinois. 135 Northeastern 733.

Salesman's Representations Held a Part of Contract.

Where a contract for the sale of an automobile contained several specifications as to price, terms, etc., but failed to state the serial number of the car sold, the Wisconsin Supreme Court ruled that a provision, "all other agreements," was insufficient to amount to an agreement that no representations had been made by the salesman, except those contained in the contract, which on its face omitted a term that was material on the issue of the falsity of the representation as to the model of the car.—*Wulfers v. E. W. Clark Motor Co.* Supreme Court of Wisconsin. 188 Northwestern 652.

Owner of Automobile Not Liable for Garage Employee's Negligence.

Where defendant stored his automobile at a garage, under an agreement requiring the garage owner to deliver the car at defendant's home and return it to the garage, it was held by the court that the garage owner's employee, a 13-year-old boy, returning the car was not liable for his negligence while driving the car on an errand for his employer after returning the car, even if defendant was negligent in permitting the boy to drive, which was in violation of the statute prohibiting driving by persons under the age of 16.—*Griesmer v. Netter*. Supreme Court of Pennsylvania. 117 Atlantic 205.

"How" of Electric Trouble Shooting

The Man Who Finishes a Job of Electrical Trouble Shooting in the Least Time Is Usually the One Who First Decides from the Symptoms Just What He Wants to Do and How He Will Go About It—Table of Lighting Troubles

By H. P. Manly

We will commence our trouble-hunting work by considering the failures that may take place in the lighting system—starting with this part of the electrical equipment because its troubles are comparatively easy to locate and because the principles used in this work will be applied to all cases later on.

Lighting trouble may take many different forms. It may affect only one lamp, it may affect only the lamps on one circuit, or it may affect all the lamps on the car. The lamps may fail to light at all, they may burn so brilliantly that in a short time the filaments burn out. The trouble may be evident under any and all conditions of operation, or it may show up only with the engine running or only with it idle.

If the trouble is apparent in only one lamp or in only one circuit—such as the bright headlamps or the dimmer bulbs—we will naturally look for the trouble only in the line leading from the one lamp back to the first junction point or switch connection, or in the line from the circuit in trouble back to the lighting switch controlling that circuit.

If the lamps do not light at all, an open circuit is indicated or a point of very high resistance in the circuit for the lamps affected. If only one set of lamps show trouble, the fault will be between the lighting switch and these lamps. If all lamps show this trouble, the fault will be found between the battery and the lighting switch.

If the lamps will light only with the engine running and if they grow brighter with increase of engine speed and dimmer with a reduction of engine speed, it indicates an open circuit or high resistance between the battery and the point at which the generator line joins the lighting supply line. This point is usually at the ammeter or indicator, as shown in the diagram of a typical lighting system. We are assuming that the battery itself is in good condition as determined by the tests applied according to instructions in the first installment of this series.

Here it is important to remember that the ground return from one side of the lamps to one side of the battery is just as much a part of the circuit as the wiring lines. It is necessary not only to follow the lines from the battery or switch to the lamps in trouble, but also to inspect the ground connections in the lamp cases and brackets and the ground connection from the battery to the frame or other metal part of the car.

One rather peculiar trouble results from a defective ground connection on a double

bulb headlamp. Referring to the diagram of lighting circuits, assume that one of the headlamps does not make a good ground on its bracket because of rust, paint, etc. This leaves the grounded sides of the bright and dim bulbs connected together through their ground in the lamp case, but does not leave the case itself connected to the car's framework.

The resistance of the large bright bulb is less than that of the small bulb and the two are now connected in series with each other. With either the dimmer switch or the bright switch turned on, the amount of current flowing through the circuit will be only that allowed by the higher resistance of the small dimmer bulb. This circuit flow will be sufficient to light the dimmer bulb with either switch turned on, but the bright bulb will not light or will only glow very dimly under any conditions. Such a symptom, then, indicates a poor ground from the lamp case to the car's framework, and cleaning and tightening the fastenings will cure the trouble.

Dim lamps with the battery in good condition are generally due to poor ground connections at the lamp sockets or in the lamp cases. This trouble may also be due to high resistance of poor connections between the lamps affected and the lighting

switch or, if all lamps are dim, between the switch and the battery.

If one set of lamps burns very dimly and, when turned on, causes all the other lamps to become dim or to almost go out altogether, it indicates a short circuit or accidental ground in the lines to this set of lamps. At the same time the ammeter will show an excessive flow of current by the pointer's traveling to the end of the scale on the discharge side. With dim lamps due to high resistance, the ammeter will show less than the normal discharge reading. Thus, with dim lamps, the ammeter reading will tell whether the trouble is due to high resistance or to short circuit or accidental ground.

If the lamps burn brilliantly with the engine running, and if they are found to burn out after a short period of use, it indicates a point of high resistance between the battery and generator at some place in the circuit from the battery to the point at which the lines divide, one going to the lighting circuits and the other to the generator. The battery is depended upon to maintain a practically constant lamp voltage in the electrical system with the generator running.

If it is difficult or impossible for the generator current to flow to the battery, this

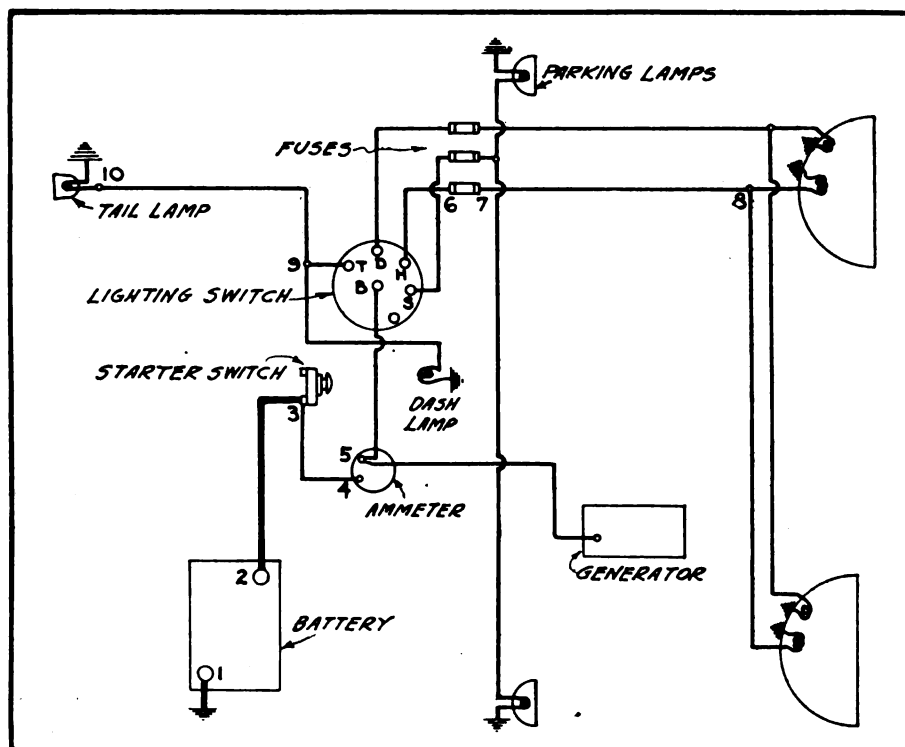


Diagram Showing Circuit of a Typical Lighting System.

current will be forced into the lamp, ignition and accessory lines. In the diagram of lighting circuits, a high resistance or open circuit between the battery and the side of the ammeter carrying the lighting switch line and the generator line would cause this trouble because the charging current would flow to the lighting switch instead of to the battery.

While considering troubles that cause the lamps to remain out or to burn dimly, it may be advisable to examine the lamp bulbs. A 9 or 12-volt bulb on a 6-volt system will burn dimly. A 6 or 9-volt bulb on a 12-volt system will burn very brightly but will not last long. A double-contact bulb in a single-phase socket, or a single-contact bulb in a double-contact socket will not light at all. While these seem to be very simple troubles, cases are common in which almost everything else is checked over first.

Flickering lamps are almost always caused by loose connections or poor grounds in the circuits affected. Generator-brush trouble or reversed generator connections may sometimes be the cause for flickering lamps. Automatic circuit breakers, the contacts of which are dirty, or which have been adjusted so that the slightest overload will open them, are also causes for flickering lamps. A short circuit, or ground, that takes place only when wires or connections are moving with the car in motion, will cause the lamps to flicker at certain times only.

According to the symptoms noted in the lamps themselves, it will now be possible to lay out a table of probable causes for ready reference when looking for this class of trouble.

Locating Opens and High Resistance.

This class of trouble is due to loose or disconnected terminals, to dirty terminal connections, to broken or partially broken wires, to poor ground connections, to dirty or bent switch connections, to blown fuses, etc. With the exact part of the circuit in which such trouble exists located, it will not be difficult for the man of average experience to determine the cause and apply the proper remedy.

The class of trouble, open or high resistance, short circuit or ground, having been determined from the method outlined in the table, it is next in order to apply a quick test to find the point at which the fault exists.

To locate open circuits, or points of high resistance, it is only necessary to have a long piece of flexible, insulated wire, with a spring clip on one end and a test prod on the other. The first test is to clip one end of this wire to the grounded side of the battery and, with the lighting switch turned on for the lamps in trouble, touch the prod to the metal frame of the car, making sure to get through any paint or dirt and reach the clean metal. If the lamps now light normally, it indicates a poor ground connection from this side of the battery.

LIGHTING TROUBLES.

1. See that battery is well charged, that cable terminals are tight and clean and that good ground connection is being made.

2. If all lamps are affected, look for trouble between the battery and the main battery terminal on the lighting switch.

3. If only certain lamps are affected, look for trouble between these lamps and the lighting switch or in their ground connections.

4. No light: (a) If lamps light when engine is running, look for open circuit or high resistance between battery and lighting switch. (b) If ammeter shows low discharge or zero, look for open circuit or high resistance according to 2 and 3 above, or for wrong base type in bulbs. (c) If ammeter shows high discharge, look for short circuits or accidental grounds in lines to lamps which cause this condition when turned on. (d) If, with double-bulb headlamps, only the dimmers light with either switch position, look for poor ground on lamp brackets.

5. Dim light: (a) If ammeter shows low discharge reading—High resistance in lines or at terminals. Poor ground connections. Bulbs of too high voltage for system. (b) If ammeter shows high discharge reading: Short circuits or accidental grounds according to 2 and 3 above.

6. Very bright light: (a) If with engine either idle or running, look for bulbs of low voltage. (b) If only with engine running, look for high resistance or open circuit between the battery and the point at which lighting switch main lines joins generator battery line, usually at ammeter or starting switch.

7. Flickering light: Loose connections, loose wires or poor ground connections according to 2 and 3 above. Short circuit or accidental ground, according to 2 and 3 above. Loose connections or grounds in charging circuit from generator to battery. Circuit breaker dirty or wrongly adjusted. Brush or commutator trouble in generator. Reversed connections at generator, wrong polarity grounded.

Next clip one end of the test wire to the underground side of the battery and, with the light switch still turned on, touch the test prod to each joint in the lighting circuit leading away from the battery to the lamps in trouble.

Referring to the diagram of a lighting system, the left-hand, bright headlamp bulb may be assumed to remain out at all times. The test wire is attached to battery post, 2, and the prod touched first to the starting switch at 3, then to the ammeter at 4, then at 5, next to the lighting switch terminal B, then to terminal H, then to the

headlamp fuse at 6 and 7, then to junction 8 at the lamp.

If, with any of these test connections made, the lamp lights normally, it indicates that the open circuit or point of high resistance is between the point then being touched and the last point touched with which the lamp did not light. For example, in the case assumed, if the lamp lights with the connection made to 3 on the starter switch, trouble is indicated in the large cable or in the connection at battery terminal 2.

If the lamp lights with a connection to 4, it indicates trouble in the line or connections between the starter switch and the ammeter. If the lamp lights with a connection to 5 on the ammeter, but not with a connection at 4, it indicates a burned-out ammeter. Similarly, with a lighted lamp, when connection is made to 7 on the fuse but not lighted with a connection at 6, it indicates a blown fuse. If no light is secured up to junction 8, it indicates a poor ground connection at the lamp, a burned-out bulb or a bulb with the wrong base type.

In testing for this trouble in the tail-lamp circuit we would make the ground test at the battery from battery terminal 1; then place the test wire on battery terminal 2 and successively touch points 3, 4, 5, B, T, and the tail-lamp connector 10. Point 9 might also be tested if it is accessible.

Locating Shorts and Grounds.

A short circuit or accidental ground between the battery and the ammeter will discharge the battery but will not show up on the ammeter. A short circuit or ground between the ammeter and the lighting switch will cause the ammeter to show a high discharge at all times. A short circuit or ground between the lighting switch and any one set of lamps will cause the ammeter to show a high discharge when the switch is turned on for that set of lamps only.

If the circuit in trouble is fused, the fuse will be blown by the discharge current, thus transforming this trouble into an open circuit at the fuse. While an open circuit or high resistance will not affect any lines except those leading away from it, considering the battery as a starting point, a short or ground will make such a heavy drain on the system that all other lamps will be dimmed or put out, depending upon the amount of current lost through the fault.

A method of locating such current leaks, which is probably as easy and simple as any, is to disconnect the cable from the underground side of the battery and temporarily connect either a lamp bulb—of the battery's voltage—or, better still, a voltmeter between the battery terminal and the end of the disconnected cable. With the short circuit or ground drawing current, the lamp will light or the voltmeter

(Please Turn to Page 30.)

Regrinding and Fitting Engine Valves

Of Course, None of the Readers of the American Garage & Auto Dealer Would "Fall Down" on a Job of Valve Grinding and Fitting—Nevertheless There Are a Surprising Number of Failures—Suitable Equipment Necessary

By J. N. Bagley

Naturally, when we want our engine valves ground, we drive the car into the garage and order it done, never once thinking that any present-day garageman would fall down on the job.

Not long ago the writer left his car at a garage with orders to grind the valves

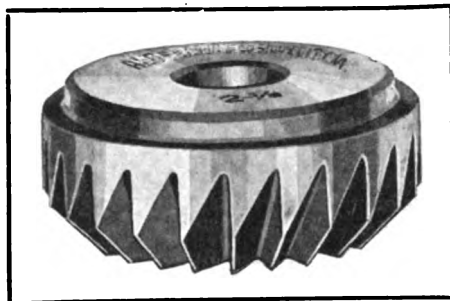


Fig. 1. Reamer for Reaming Out Seat.

and adjust the tappets, never doubting but that any man in the place could do the job in a workmanlike manner. They advised me that I could get my car by evening and I went back to my work.

In the evening I called for my car to do a little errand a few miles out of town. The repair tag called for \$10.50 and, while a little high for grinding valves, I paid the bill and drove the car out.

The car was very hard to start and when started would not idle well. Neither would it pull well, but as it was necessary that I make the little drive to the country I started, thinking it would do better when warmed up. I had gone but a short distance when two cylinders began to misfire and, in the course of a half mile farther, a third cylinder began to get in with a miss occasionally.

I stopped the car and removed the plate from the engine, which covered the valves, and found that the valves were riding on the push rods sufficiently to prevent the

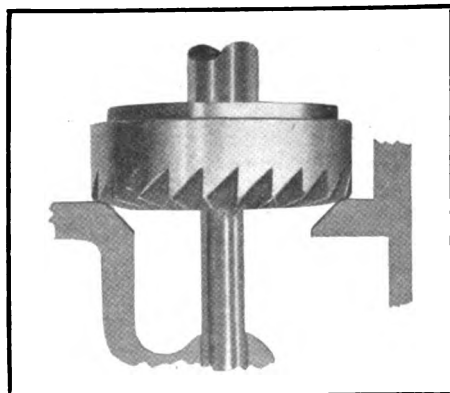


Fig. 3. Use 15-Degree Reamer for Re-cutting.

valves from seating properly. After a time I managed to adjust the tappets, so I completed the trip but at no time did the engine perform as it should. In fact, it did not run as well as it had before the valves were ground.

The following morning I telephoned Tim Donahoo, at the Springs, and he came over, got the car and fixed it up and it's working fine.

Although much has been written on the grinding and fitting of valves, it seems that there are still many men having the title "automobile mechanic" who could profit by following the methods used in Tim's shop.

It is indeed surprising to find as many garages as there are without the necessary equipment for fitting and grinding valves. Just why this is I am unable to say, for the necessary tools for doing the work are not expensive and may be had from almost any jobber of automotive accessories or shop equipment in the country. The following is the method employed in Tim Donahoo's shop and, judging from the way the engine works after Tim has finished with it, the method is good. With Tim's permission I

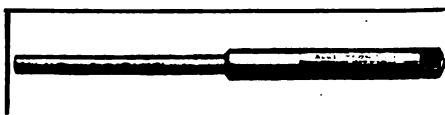


Fig. 2. Slip Reamer Over Pilot Stem.

am passing it along to others who may profit from it in case they are not already familiar with the method:

In the first place, Tim gives the engine a number of tests to ascertain what is needed. Many times there are symptoms of valve trouble when the valves are not at fault. In a case of this kind, grinding the valves would be a waste of time and it would be necessary to get at the seat of the trouble even though the valves were ground. For instance, a lean mixture and leaky valve stems act very much the same.

In case the valve stems are worn sufficiently to permit the air to enter during the suction stroke of the piston, it will be necessary to readjust the carburetor to overcome the trouble. In doing this the engine may idle well, and when it is speeded up the mixture will be too rich and the engine will not work well again.

In this particular instance new valves and new guides will be necessary or an oversized valve can be put in and the guide reamed to fit. When fitting new valve stems in new guides, or in fitting over-sized stems to reamed guides, Tim laps the stem in to

obtain a working fit just as he laps in the piston.

The lapping is continued until, when the stem and guide are thoroughly cleaned in gasoline and oiled with light

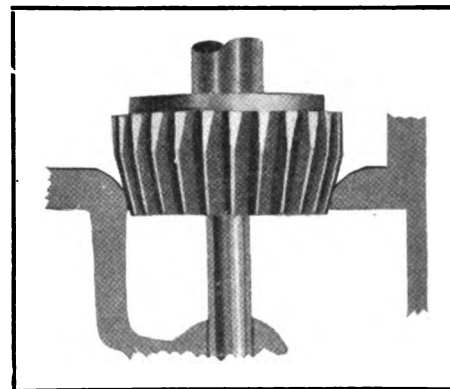


Fig. 4. The 75-Degree Reamer.

oil, the weight of the valve will cause it to move slowly through the guide.

The valve is now ready for seating and is handled in the following manner: The seat is reamed out with a reamer as shown in Fig. 1, slipped over a pilot stem as shown in Fig. 2. These stems fit the guide perfectly, holding the head in exact alignment while re-cutting the seat.

In re-cutting the seat, the seating surface is in nearly every case increased from $3/32$ of an inch upward to $1/8$ -inch, in which case it should be reduced to a narrow, even seat, to prevent carbon from collecting under the valve when it is in open position. And then again the bearing surface may be quite a little wider on one side than on the other. In either case Tim uses a 15-degree reamer, as shown in Fig. 3, reaming down from $3/32$ to $1/8$ -inch, giving plenty of clearance around the top of the valve seat.

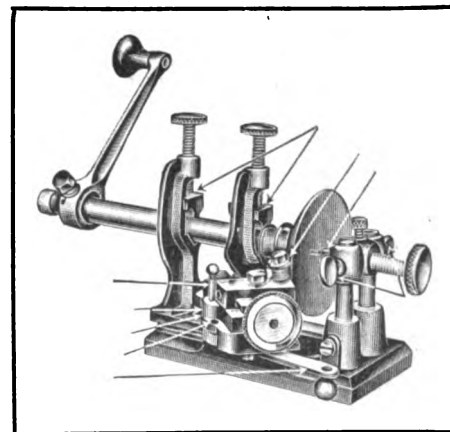


Fig. 5. Valve Placed in Valve Lathe.

The 75-degree reamer is then used, as shown in Fig. 4, and the cutting continued until the valve seat has a surface of about $\frac{1}{8}$ -inch for the valve to seat upon. The seat is not narrow enough that the valve may be easily and quickly seated, and when the valve head is raised by the cam the surface is so narrow that the chance for carbon to collect is reduced to a minimum. The valve will hold compression just as well on a seat $\frac{3}{32}$ of an inch wide as it will on a $\frac{1}{4}$ -inch or $\frac{3}{8}$ -inch seat and is much easier to seat.

Now that the engine block is ready, the next step will be to fit the valve and grind it in. The valve is first placed in the valve lathe, as shown in Fig. 5, which consists of a little tool that may be placed in the vise or screwed to the bench. This tool is self centering, and refaces valves from $1\frac{3}{8}$ inches to $4\frac{1}{2}$ inches in diameter. The tool has a swivel center device that brings the center adjustment automatically into perfect alignment on the valve. The two-clamp devices take any size stem and hold the valve firmly and steadily against the cutter, while the crank, fastened to the valve stem, turns the valve. A few turns of the handle and any irregular surface is reduced and the head is made true and smooth.

The valve is now ready for the final fitting to the seat which is accomplished by the grinding method. A light spring is slipped over the stem, just long enough to hold the valve about one inch above the seat, but not too strong for a slight pressure to force the valve down to the seat.

The valve is now ready for grinding and the tool shown in Fig. 6 serves the purpose very nicely. The working parts are so arranged that, while the crank is turned in a continuous direction, the driver is driven a full turn forward with a $\frac{3}{4}$ -turn backward, gradually completing the circle.

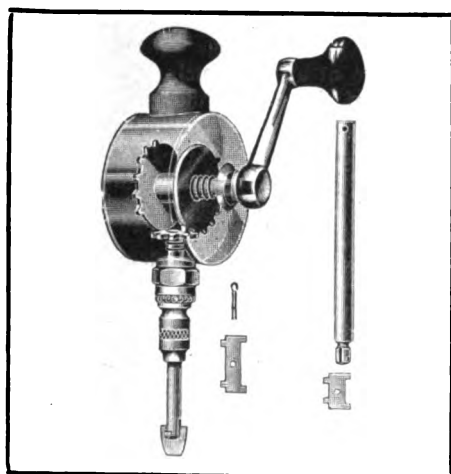


Fig. 6. Tool for Grinding Valve.

Now, by lifting the tool slightly while the crank is being turned, the spring under the valve head holds the head in contact with the driver so that, when the valve is placed again on the seat, a new position is had and the cutting compound is shifted, pre-

venting a groove being cut in either the valve head or the valve seat.

The first grinding is done with the coarse compound, after which the valve and seat are thoroughly cleaned, the fine or finishing compound is used, and the operation repeated. It is then cleaned thoroughly and the stem and guide lubricated and placed in position ready for final adjustment. When the valves are all ground the springs and keepers are placed and the tappets are adjusted. A tool known as a thickness gage serves this purpose very nicely and the most common type is that shown in Fig. 7. It is supplied with a number of steel blades which may be shifted into any position at will, the blades being of different thicknesses, which range from 1.5 to 0.015 inch.

Tim makes a rough adjustment of the valves, using no gage at all and being careful that none of the valves are riding. Then he starts the engine, letting it run until well warmed up, when he stops it and readjusts all the tappets until the 0.002 blade will just move freely between the end of the valve and the tappet. Next he locks the nuts securely and tests the engine out carefully.

Should the engine fail to function properly for any reason, each and every cylinder is tested out separately by removing the plug wires from the remaining cylinders after the engine is started. In this manner the weak cylinder is located and corrected.

Many times a valve stem will stick a trifle in the valve guide, especially if the guide and stem are new, thus causing the engine to misfire. Should this be the trouble, however, and unless the trouble is unusually bad, a little running of the engine will in nearly every case loosen the stem in the guide until it will work freely after the engine has been run a few minutes.

A sprung valve stem many times gives no end of trouble—therefore, all valve stems should be tested before replacing them in the engine for the final test. A very good method to use for this is to place the valve between the centers of the lathe and revolve it slowly. Any little variation will be quickly detected. This method will also disclose any warping of the valve head which might exist.

Should a valve head be warped or the valve stem sprung the better way to handle the job will be to replace with new valves, but many times a new valve cannot be had and a temporary repair must be made.

By placing the valve between the centers of the lathe, the stem may be straightened with a dummy tool in the tool post. Turn the valve until the high place faces the dummy tool, when the screw may be made to force the tool against the stem, crowding it over to place. One should proceed cautiously, for a little pressure does the trick. As soon as the stem is straight, the valve may be placed in the valve lathe shown and the head faced true with the stem. When both the stem and the seat

are true the valve may be ground in the manner already mentioned and a very good job will result.

The tools mentioned in this article are not expensive and are very necessary to do good work. No mechanic should be with-

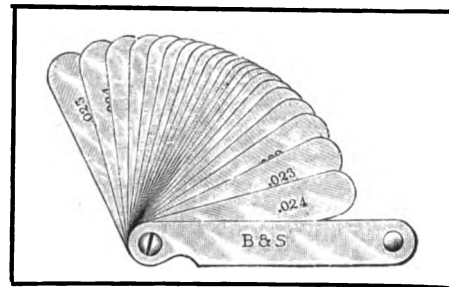


Fig. 7. Common Type of Thickness Gage.

out a set of them in his kit. The tools may be had from nearly any one of the hundreds of automotive accessory jobbers throughout the county but, if for any reason they cannot, the writer is quite sure that the editor of AMERICAN GARAGE & AUTO DEALER will be only too glad to put any reader in touch with the manufacturer of these tools.

Tim also advises that the manufacturer of these tools gives free sharpening service—that is, no charge is made for re-sharpening any of the various styles and shapes of cutters.

So much depends upon the condition of the valves—whether or not the engine gives service—that no mechanic should spare pains or money to purchase the necessary equipment to handle the work in a workmanlike manner.

Large Increase Reported in Number of Automobiles in Canada.

Farmers of Ontario, Can., own more than one-third of the automobiles registered in the province. They constitute the largest single automobile owning class. Statistics compiled by the provincial government show that, of a total of 181,978 passenger cars listed last year, 64,045 were owned by farmers.

Storekeepers constitute the second largest automobile owning class, with 23,680 cars, and merchants rank third, owning 16,700 cars. Commercial travelers own 5,311 cars; doctors own 3,934; real estate agents 1,098; contractors 2,961 and drovers 651. Any idea that the motor car is a source of class distinction is shattered by figures showing laborers as owners of 4,059 cars.

The growth in the number of automobiles in Canada in the last ten years has been phenomenal. At the beginning of 1912 there were 21,682 passenger cars and trucks in the whole of Canada. At the beginning of 1922 this total was increased more than twenty-fold, to 454,049. A conservative estimate places the number of passenger cars and trucks in use in Canada at 500,000.

Canada ranks second to the United States in the proportion of cars to population with one car to every 18 persons.

How and Why of the Storage Battery

Not Only Car Drivers but Mechanics and Service Men as Well Have in Many Cases Found the Storage Battery a "Black Mystery Box"—Purpose of This Article to Explain Underlying Principles of Storage Batteries

By S. E. Gibbs, M. E.

Superintendent of Shops, Des Moines University

The storage battery has often been called the "Black Mystery Box." There is more of truth than fiction in the application of this name. In too many instances the storage battery is more or less of a mystery not only to drivers but to mechanics and service men who are responsible for much of the battery's treatment.

There are more than 10,000,000 storage batteries in use in the automotive industries, and it is said that they remain in service only one-fourth of what should be their normal life if they were properly used. This service condition, and the enormous financial loss involved, opens up a large field in which battery experts can render the motoring public a much-needed service, for which they can legitimately charge a good price.

The underlying principles and theoretical detail involved in the storage battery are comparatively simple but include some things from several sciences, namely: chemistry, electrical engineering and considerable physics. This condition is probably responsible for the general lack of understanding, and makes it necessary that one who wishes to become a battery expert study certain fundamentals of each science.

If these particular fundamentals are to be dug out of general textbooks, much time will be required; while if they are separated from the mass of interesting but not necessary information for the battery repairman, they can be mastered in a short time. The purpose of this article is to explain the necessary underlying principles of storage batteries, but no attempt will be made to go into anything other than those things the service man must know if he is to become competent to handle all sorts of battery troubles.

The storage battery has often been spoken of as a device for storing electrical energy but, in reality, it is a device that generates electricity by chemical means under certain conditions. When electricity is caused to flow in the proper direction through the storage battery, a certain chemical change is brought about within the cells. This action can be caused to take place only until the battery has become fully charged.

A charged battery, when connected in a suitable circuit, will cause a current to flow and this action is caused by an internal chemical action which is the reverse of that which took place when the battery was being charged. Therefore, strictly speaking, electricity is not actually stored in a storage battery.

While a battery is being charged it is heated somewhat and certain particles of the plates are broken loose. Again, on discharge, similar actions take place. These conditions represent a loss of energy so that the battery never gives out as much energy as was put into it while being charged.

The ratio between the energy supplied and that given out—in other words, the efficiency—is from 70 to 95 per cent. The best efficiency is obtained when a battery is charged, then discharged a small amount, and then recharged within a short period of time.

If the charging and discharging rates are comparatively low, the efficiency is better than when high rates are used. The lowest efficiency is obtained when the battery is charged and discharged at high rates, when considerable time elapses between charging and discharging, and when the battery is nearly or completely discharged each cycle.

No one knows just what electricity is, but much is known about how it acts under various conditions. Electricity generated at one place may be transmitted to other places if a circuit is arranged so that it may return to where it started. If the circuit is broken the flow will be stopped, and if it is again completed the flow will be resumed.

Anything that a current of electricity will flow through is called a conductor. Most metals are conductors but some are much better conductors than others and will carry the most current under any given conditions. Copper is the most common conductor as it is the best conductor of the ordinary metals. When the amount of current flowing through a conductor becomes excessive it will become hot and, in extreme cases, may melt.

Certain units have been established for measuring or describing the various characteristics of electricity. There is a very close analogy between an electrical system and a

city water system. A current of electricity that is flowing in a conductor can be measured as easily as a current of water flowing in pipes. The amount of water that will flow through a pipe depends upon the pressure and the friction in the pipe; likewise the amount or volume of current that will flow through a wire depends upon the electrical pressure and the resistance of the wire.

The force that causes a current to flow through a circuit is called electromotive force, usually written E. M. F. The unit of E. M. F. is the volt.

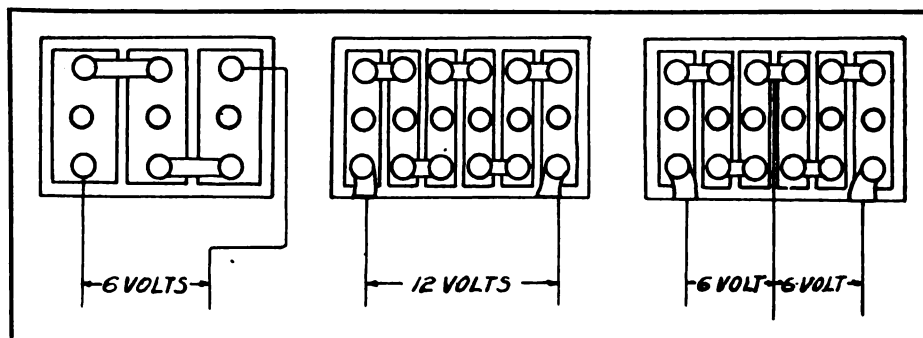
The quantity of water flowing in a pipe is spoken of as gallons per second. An electrical current is measured in amperes. If one ampere flows for 60 seconds, the total quantity is 60 ampere-seconds or 60 coulombs. The ampere is, therefore, the current strength or intensity of flow, but in common practice it is referred to simply as the volume or quantity of current flowing.

An ohm is the unit of electrical resistance. The ohm is the amount of electrical resistance that will limit the flow of an electric current, under an electromotive force of one volt, to a current of one ampere.

The watt is the unit of electrical power. The watt is obtained by multiplying amperes by volts and it can be reduced to horsepower by dividing the watts by 746. Conversely, one horsepower is equal to 746 watts.

Each cell of a storage battery produces a pressure of approximately two volts, regardless of the size of the cell. The two posts or outlets from the cell are called positive (+) and negative (—). Current is usually thought of as leaving the cell by way of the positive post and returning to the negative post.

The size and number of plates in a cell



Voltage of Various Cells Is Added When Connected in Series, Total Voltage Being Approximately Two Times Number of Cells.

indicate, to a large extent, the capacity of the cell. In other words, by increasing the size or number of plates in a cell, it could be made to produce a given amount of current for a longer period of time. The additional plate surface would also permit a greater current to be drawn from the cell. However, the type and condition of the plate is also a determining factor to be con-

| Sp. Gr. | |
|---------|----------------------|
| 1.280 | Fully charged |
| 1.260 | Three-quarters |
| 1.225 | One-half |
| 1.160 | One-quarter |
| 1.150 | Discharged |

Table No. 1, Hydrometer Readings.

sidered when figuring capacity or rate of discharge.

Various voltages, rates of flow and capacity may be had by various methods of connecting the cells or batteries.

A series connection is one in which the positive of one cell is connected to the negative post of another. Thus the voltage of the various cells is added when connected in series and the total voltage is approximately two times the number of cells. Storage batteries, as used for starting automobiles, usually consist of three or six cells connected in series. Thus they are spoken of as six or twelve volt batteries.

A parallel or multiple connection is one in which all the negative posts and all the positive posts are connected together. The effect is the same as adding to the size or number of plates, so the connection is seldom used in commercial use with storage batteries.

A multiple-series connection is a combination of the multiple and series connections. Thus, two groups of three cells could be connected in series and then the two groups connected in multiple. A good example of such a connection, as used in practice, could be obtained by connecting two 6-volt batteries in multiple, when starting a stiff motor or when each battery is partly discharged. The result would be an increase in capacity, but the E. M. F. would still be six volts.

The capacity of a battery is generally spoken of as a certain number of ampere-hours. Capacity varies with the rate of discharge. A battery that has a capacity of 100 ampere-hours, at a 5-ampere discharge rate, would probably have 75 amperes at a 10-ampere discharge rate.

So far, the electrical units have been discussed but no mention has been made of the chemical or internal working of the battery.

The cell consists of a hard rubber jar, two kinds of plates, insulation which is placed between the plates, a cover, two posts and the electrolyte. The two kinds of plates are called positive (+) and negative (-), and each group is connected to its respective post. Two large plates could be used but such construction would be bulky, so several smaller plates are usually

used in the smaller batteries such as are in use on automobiles.

There is always one more negative plate than positive so there is a negative plate on each side of each positive plate and there are always negative plates on the outside of the group. The separators are used to prevent the two kinds of plates from touching or short-circuiting, but should allow as free passage of the electrolyte as is possible.

The plates consist of a lead framework, called a "grid," and the active material, which is lead peroxide on the positive plate and sponge lead on the negative.

The electrolyte is sulphuric acid (H_2SO_4) and pure water (H_2O). When the electrolyte comes into contact with plates under certain conditions, lead sulphate ($PbSO_4$) is formed. This new material fills up the pores of the plates and is the result of the combination of the electrolyte with the active material of the plate.

Such an action is always taking place when the battery is discharging or generating electricity. When it is being charged, the sulphate is being disassociated and sulphuric acid is again being formed. One might say the acid goes into the plates while the battery is being discharged and is driven out when being charged.

The state of charge of a battery can be determined by the amount of sulphuric acid in the electrolyte. If the battery is nearly discharged, the acid will be combined with the active material of the plates and the electrolyte will be chiefly water. If it is charged, the electrolyte will contain a large amount of sulphuric acid.

A specific gravity reading enables one to tell the state of charge of the battery. By specific gravity is meant the relative weight of any substance compared with water as a basis. Pure water has a specific gravity of one and is usually written 1.000 and spoken of as "ten hundred." An equal volume of concentrated sulphuric acid—oil of vitriol—to that of water weighing one pound, weighs 1.835 pounds. Therefore, it has a specific gravity of 1.835 and is spoken of as "eighteen thirty five."

When a storage battery is fully charged, the specific gravity of the electrolyte should be 1.280. A reading of 1.150 indicates a discharged battery. Table No. 1 will prove useful when determining the state of charge of a battery.

The specific gravity of the electrolytes, like most liquids, varies with the temperature and so reads less as the temperature is increased, although the strength remains unchanged. Seventy degrees Fahrenheit has been adopted as the standards for a basis of comparison of specific gravities of electrolyte. Each increase of three degrees Fahrenheit will lower the specific gravity approximately 0.001.

Usually a certain amount of lead sulphate remains in the plates and acts as a binder, much as cement does in a concrete wall. If the battery is overcharged, too much sulphate is driven out of the plate

and, in extreme cases, the active material will fall from the grids. The positive plate is especially affected when the battery is overcharged.

Charging at too high rates overheats the battery and also injures the plates and separators. The temperature should never be allowed to become more than 110 degrees Fahrenheit.

Freezing will burst the jars and also cause the active material to loosen from the grids. However, the battery that is well charged will not freeze at ordinary temperatures. In other words, if the electrolyte is strong, the battery will not freeze easily. Table No. 2 will serve as a guide when cold weather is to be endured.

When a battery is kept full of water and charged, and in at least occasional use, the sulphate remains in an active state. If these conditions are not maintained, the sulphate becomes inactive and becomes troublesome. It is a non-conductor and, when formed over the surface of a plate, practically isolates it. A slow charge will sometimes convert this inactive sulphate into active sulphate but often plates are sulphated beyond repair if not properly cared for.

The term "sulphated," as ordinarily used by battery men, is used to indicate the plate in which the sulphate has become inactive. This should not be confused with the normal sulphation that is always going on within the battery.

Every precaution should be taken to prevent any foreign substances from entering a battery. There are hundreds of ordinary substances which can easily be put into the battery with some of the parts, or when adding water, that would injure or in many instances ruin a battery.

Only a pure grade of sulphuric acid should be used in batteries. It is usually best to buy acid only from reputable firms that are selling a special battery acid. It can be bought diluted to 1.400, as is usually done when buying in comparatively small quantities, since it is easy to handle and requires no mixing. If 1.835 acid is bought, it should be remembered that great care

| Sp. Gr. | |
|---------|---|
| 1.150 | battery discharged—13 degrees above zero. |
| 1.160 | battery $\frac{3}{4}$ discharged—zero. |
| 1.225 | battery $\frac{1}{2}$ discharged—38 degrees below zero. |
| 1.260 | battery $\frac{1}{4}$ discharged—60 degrees below zero. |
| 1.280 | battery fully charged—100 degrees below zero. |

Table No. 2, Freezing Point of Electrolyte.

should be exercised in handling it and diluting it for use in batteries.

Acid should be poured slowly into water when mixing, and water should never be poured into acid as an explosion would probably be caused. When the acid is diluted, it will become hot and should be cooled at least 24 hours before being put

into a battery. A glass container is probably best for storing acid. A well-glazed stone jar, or a rubber container, is sometimes used.

Sulphuric acid will eat up practically all clothing except woolen, so a rubber apron should be worn. Rubber gloves should be used to protect the hands, as the acid will discolor them and make them sore. A solution of baking soda should be used to counteract acid. If put on clothing soon after the acid reaches it, the damage will probably be slight. Such a solution should be kept at hand for emergencies and the hands should be washed in it after working around the acid.

Only pure water should be used in a battery. Distilled or rain water that has been caught in a glass or stone jar is the only safe water to use. Rain water that has run over a roof or through metal spouts should never be used. Iron, and other similar elements which are often in water, will produce local action and cause the battery to discharge within itself.

All wood, such as separators or separator hold-down blocks, should be carefully treated to remove acetic acid and other injurious substances. Once in a while some one puts alcohol into a battery in the hope that it will keep it from freezing, and the

result is that it quickly forms acetic acid and eats up the plates, thus ruining the battery.

Carelessness is the battery's greatest enemy. Lack of water, overcharge, too rapid a rate of charge, and standing unused or discharged ruins more batteries than actually wear out in use. Much of this carelessness is the owner's fault, but some of it can be traced to men who represent themselves as battery repairmen.

Carefulness is the best asset a battery man can have. Within the next few years the public will learn to give batteries reasonable care and will have most of the repairing done by men who really understand batteries and are careful workmen. Time spent in studying the underlying principles of the battery will prove a good investment to the battery service man.

SOME BUSINESS-STIMULATING IDEAS—AUGOS SERVICE STATION

(Concluded from page 20)

this station and he tells others, thus insuring the success of the station in his own home town.

The instant success that has been found possible with these new service stations is giving the company confidence to enable it

to expand its operations, so that in time, the Augos service stations will be dotting the landscape in many places, thereby giving the traveling public a real good place to get service and also stop and get information when they need it.

Two men usually operate these stations, the supplies coming to them daily by truck service. Patrons were asked to offer suggestions, and any used are paid for according to their adaptability to a service station.

Fourth Annual Show of the Automotive Equipment Association.

The Automotive Equipment Association will hold its fourth annual show, at the Coliseum in Chicago, the week of November 13 to 18 inclusive.

The show this year is to be a *closed show*, which means that it will be for the members of the association only, and that the manufacturing members will be the only ones permitted to display their exhibits and the jobbing members will view same. No manufacturers or jobbers not connected with the association will be able to take part in the exhibit.

This is a new feature and, up to the present time, 265 spaces have been allotted for 212 exhibitors.

"How" of Electric Trouble Shooting

(Concluded from page 25.)

will show a reading. With the trouble removed, the lamp will go out or the meter will drop to zero.

If, with the lighting switch in the off position, the lamp or meter shows a ground, the trouble is between the battery and the switch. If no ground is shown under this test, the bulbs are removed from all lamps and the lighting switch is turned on in various positions. In one of them the lamp will light or the meter show a reading, indicating a short or ground in the circuit then turned on. If that circuit is fused, the fuse or a new one, may be temporarily removed. If the lamp or meter indicates trouble with the fuse out, the fault is between the switch and the fuse but, if removing the fuse puts the lamp out or allows the meter to drop to zero, the trouble is between the fuse and the lamps of the line turned on.

We have now located the trouble as being either between battery and switch, between switch and fuse, or between fuse and lamp—referring to the lighting circuit diagram for an example. To locate the exact portion of the circuit in trouble, it will now be necessary to temporarily disconnect the terminals between the points already determined upon.

Assuming the fault to have been located between battery and switch, we would first disconnect point B on the switch. If the trouble indication disappears, it shows the

fault to be in the switch. Next disconnect point 5 at the ammeter. If the lamp goes out or the meter returns to zero, it shows the fault to be in the line from switch terminal B to ammeter terminal 5. In this way we work backward to the battery—the trouble being between the point disconnected when the lamp goes out, or the meter shows zero, and the last point disconnected at which the indications still showed trouble.

Similarly, if the trouble is between the lamp and the switch, we work backward from lamp to switch, disconnecting each point temporarily and locating the fault between the first one at which no trouble is shown by lamp or meter and the last one disconnected.

Number of Automobiles in Chihuahua, Mexico, Doubled.

In spite of the general business depression and the lack of good roads in the Chihuahua district, the 650 passenger automobiles in use at the end of June, 1922, represent an increase of 100 per cent over the preceding year.

Consul J. B. Stewart states that this notable increase is due to settled political conditions in all parts of the state and to the establishment by an American firm of the first automobile sales agency using American methods, by means of which

prospective purchasers are enabled to obtain their cars without making a special trip to the United States.

The sales of low-priced light motors have greatly outnumbered those of all others, but there has been a decided tendency during the past six months toward the heavier and higher-priced cars.

Italian Automobile Manufacturers Receive Large Orders.

Although the general industrial situation is still disturbed by strikes, Italian automobile manufacturers in Milan have received an unexpectedly large number of orders, a considerable part of which originated in foreign countries, cable dispatches from Assistant Trade Commissioner A. A. Osborne, Rome, state.

New Zealand a Good Market for Marine Motors.

Due to excellent boating facilities there is a good market for motors for small boats and yachts in New Zealand.

The U. S. Department of Commerce is informed by Consul MacVitty that American marine motors are exceedingly popular in New Zealand because of their price and reliability and, despite the preferential tariff and exchange rates favoring British manufacturers, the American product can be sold with profit.

Making Packing Rings for Automobile

Over-Size Rings of Standard Sizes Can Be Purchased But Occasionally Rings of Odd Sizes Are Needed That Are Not on the Market—How to Make Set of Odd Over-Size Rings on Lathe Without Special Fixtures and Tools

By Gustav H. Radebaugh

Cast iron piston rings are universally used in the pistons of small reciprocating engines. They are used on the piston so that it will have an air-tight, and yet a free-running, fit in the cylinder, and in this

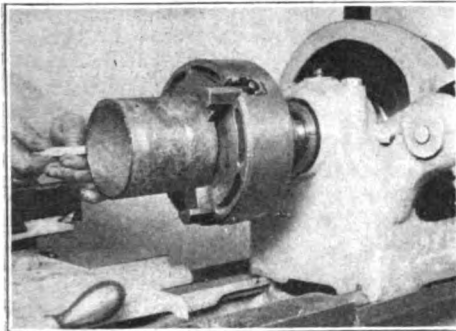


Fig. 1. The Tub Should Be Chucked So It Will Run True.

way preventing decrease of pressure due to leakage of gases past the piston.

They should be made from close-grained, gray, cast iron and are cast separately or in ring pots, oftentimes called tubs. The principal reason for using cast iron is its low price. It can be cast into suitable tubs or pots; it holds machine work to a minimum; it is close-grained and elastic; often after being in use a short time, the face comes in contact with the cylinder and makes a mirror-like surface; and, finally, it is easily turned, bored and faced on the lathe.

In describing the machining of a piston ring in the lathe, the general machining practices can be applied to many types of lathe work. The making of piston rings in the repairshop is not as common now as it was several years ago, when oversize rings were not on the market.

It is often necessary, however, to make up a special set of rings—either for tractor or stationary engines—as it is impossible to secure the necessary diameter or

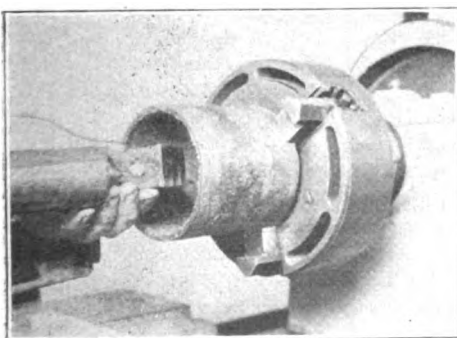


Fig. 2. Hold the Tub Securely in Chuck With Tail Stock Center.

widths from the odd-size rings found on the market. Some dealers, instead of making new rings in their shops, discard the old piston when it is impossible to find odd-size commercial rings. This, no doubt, is much more costly than making the rings in the shop to fit the piston of odd-size requirements.

Ring pots should be made from the best grade of cast iron. The casting must be free from blow-holes or spots. It is also very important that the iron be soft so that it will machine easily. An assortment of sizes should always be available, as many times a breakdown on account of a broken piston ring can be repaired and returned to surface much quicker than a ring could be ordered from the central supply store.

Different styles of lathe chucks have been reviewed in another article. The chuck shown in use in Fig. 1, where the operator is chucking the ring pot, is a three-jawed chuck and will be found exceptionally adapted to a job such as this.

Notice how the chuck jaws have been reversed so that the wider face of the jaw comes in contact with the casting. This is done to permit machining the casting to within an inch of the end, making it possible to cut two or three more rings from the pot. The casting should be chucked concentric.

To check the chucking position, the work is removed and a piece of chalk held stationary so that the high side will hit the chalk, thus leaving a chalk mark which indicates to the operator the necessary jaw adjustment of the chuck. In chucking a piece, after the jaws of the chuck have been partially tightened down, the casting should be driven against the chuck face. This will align the casting.

To hold the casting more firmly in the chuck—when it is impossible to support the outer end with the live center—a block of cast iron, provided with a center hole, is used that is short enough to enter the casting and yet is of sufficient thickness to make a rigid support for the dead center when it is placed against the ribs in the chucked end of the casting.

To get a better idea of this arrangement refer to Fig. 2. The operator is adjusting the cast iron block against the tail-stock center. The tail-stock is then adjusted forward on the ways of the lathe until the block comes in contact with the end of the casting. The tail-stock is then clamped down and adjustment is made if found necessary.

Radial facing on a lathe is a very much used cutting operation. The face of the stock is machined while held in the chuck or on the face plate. One job of radial facing is shown in Fig. 3. The end of the

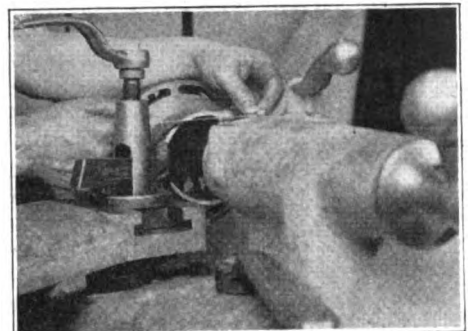


Fig. 3. Radial Cut Testing for Flatness With Six-Inch Rule.

ring pot has a cut taken over it. The operator is testing the machined surface for flatness by using a 6-inch rule as a straight edge.

In radial facing, the spindle of a lathe should be free from end play, as this will cause the cut to be uneven. To further insure the proper set-up for an even surface, lock the carriage with the locking screw found to the rear of the saddle.

When taking the cut on a job such as shown here, use a narrow, round-nose tool and, if possible, remove the hard outer scale in one cut. The tool should be fed by hand-driving the first cut, as the operator will have considerable advantage in controlling the cutting pressure put on the job, thus minimizing the danger of jerking the pot from the chuck.

It is always advisable to take a radial cut on a job before boring the hole, as it eliminates the danger of tool damages on the hard outer scale of the casting when the operator is starting the boring tool.

Some rings are made without having the

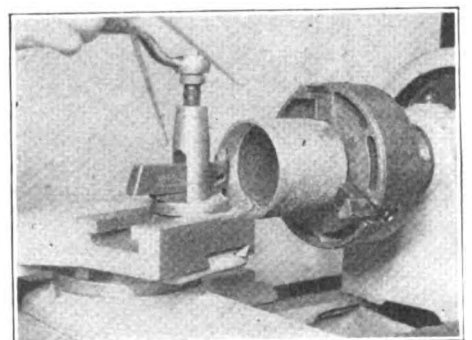


Fig. 4. Turning Out the Inside of the Tub.

inner surface machined, the theory being that the original skin of the casting adds materially to the strength and durability of the ring. In making rings in this manner, it is obvious that a ring pot must be molded with an accurately finished cone.

It is not advisable for the repairshop to stock up on ring pots molded in this manner, as it is only possible to make one size ring from a pot. When the pots are to be bored to size, several sizes of rings could be machined from the one casting.

One standard ring pot will make six to eight rings. If only one or two rings are to be made, it is advisable not to bore the inner surface more than to the necessary depth for the job required. The simplest way to do this is shown in Fig. 4.

Notice how the right-hand tool holder is placed in the tool post, thus making it possible to use this outside tool as a boring tool. The reason this is recommended is because it eliminates entirely the flexible boring tool which, if used, would have a tendency to spring away from this work, causing the machined surface to be irregular.

This method also makes it possible to bore the inner surface much more rapidly than by using a boring tool. In doing this operation, it is impossible to support the casting in any way with the tail-stock center. If the chuck does not hold it in the proper position, the outer end of the casting can be supported with the steady rest. This, however, is very seldom necessary.

There are two kinds of rings—the concentric and the eccentric. Both are machined in the same manner, with the exception of the bore. The casting is shifted, after being machined on the outside, for the boring operation on the eccentric ring. The reason given by designers for using the eccentric ring is its uniform pressure against the cylinder wall all around the

circumference. This does not seem to be important, as many manufacturers use the concentric ring.

Getting the Size of the Ring.

One of the most perplexing problems that the machine operator meets when making piston rings is determining the correct size for the ring. It seems, at first thought, that the ring is bored out to the diameter of the bottom of the ring groove in the piston. This is not the case, however, because when the ring is split and compressed this bore would not be sufficient to clear the bottom of the piston groove.

The outside diameter is still more perplexing, as it is necessary to allow for compression of the ring and the necessary material for finishing when under compression. All of these problems are

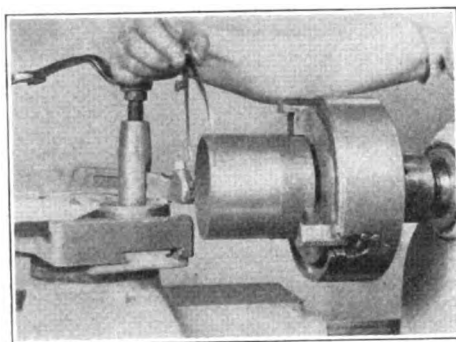


Fig. 6. Taking the Outside Cut.

answered in the table shown in Fig. 5, where the machining measurements are given for several common sizes of the rings. The following rules will make it possible to figure sizes for rings other than those shown in the table:

1. Outside diameter, A , of a finished eccentric or concentric ring before being split should equal 1.035 times cylinder bore.
2. Concentric ring — Thickness, D ,

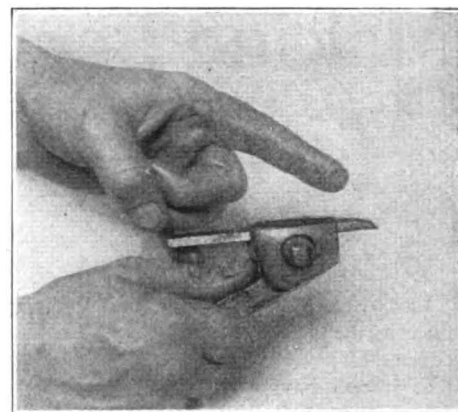


Fig. 7. The Special-Shaped Parting Tool.

equals approximately $1/332$ of the cylinder diameter.

3. Eccentric ring—Thickness, D , is equal to cylinder diameter divided by 27.5. Thin side, E , equals one-half the maximum thickness.

4. Width, C , should equal the cylinder diameter times 0.05.

5. Amount, B , to cut out of the piston ring as measured along the outer circumference equals the cylinder diameter times 0.09.

6. Amount to allow between ends of joint for expansion equals the circumference of ring times 0.0000556 times rise in temperature in degrees, which is about 300 degrees.

A majority of mechanics admit that the most difficult job in making piston rings is to secure the correct machining sizes so that, when the ring is split, it will be of the correct size to be machined on the outside for cylinder diameter. By using the table Fig. 5, or the rules it will be possible to determine the amount to cut from the ring for compression, eliminating the "guess-and-try" method so common when making rings.

The practice of using the old ring to get sizes is common in some shops. This is not recommended because it is nearly impossible to determine the correct diameter of the ring before it is cut. This is very important, as it is this dimension that gives the ring its elasticity or spring. The sizing of the outside diameter is shown in Fig. 6. Notice how the spindle of the tail-stock is arranged to assist in firmly holding the tub in the chuck.

In the cylindrical turning of a cast-iron tub, such as is being machined in this operation, care must be exercised in gaging the depth of the cut and coarseness of feed as the casting is not very heavy and will not stand excessive strain. Heavy cuts spring the work, which causes the tool to gouge in. Oftentimes excessive stress cracks will show up on the casting when it has been clamped too tightly in the chuck.

A rough cut should be taken first, the job being finished to size with a light cut with a keen-edged turning tool. In connection

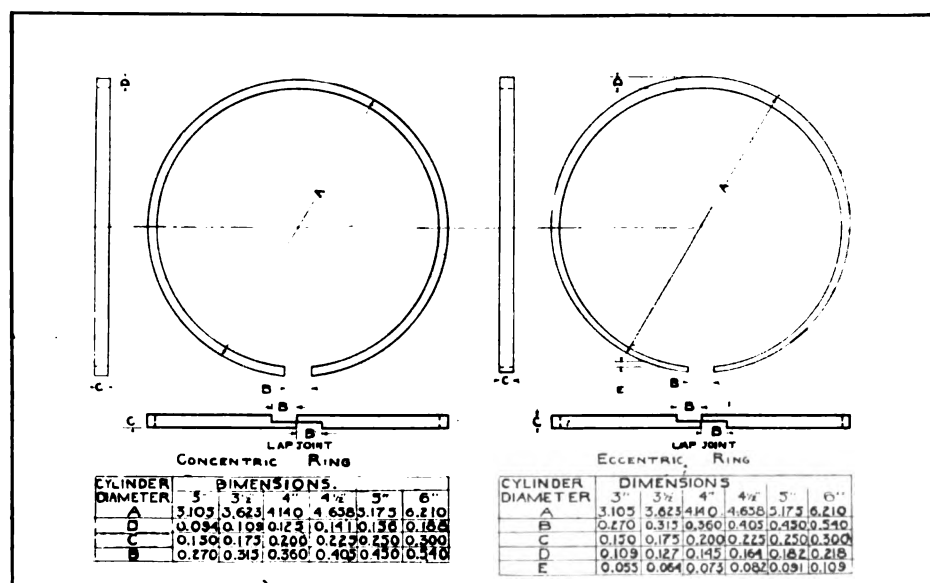


Fig. 5. Determining the Correct Dimensions of the Rings.

with lathe work there are two classes of cuts—the roughing and finishing cuts.

In machining operations, such as this one, it is to an advantage to rough the diameter to size within $1/32$ of an inch.

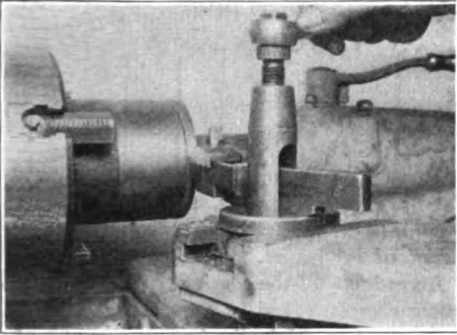


Fig. 8. First Operation is to Cut Ring From the Tub.

Then, with a newly ground tool, finish to diameter. If, when taking the roughing cut, it is impossible to get underneath the outer skin of the casting in the first cut, the remaining outer skin can be removed with a file. This will prevent repeated dulling of the tool.

The Use of the Parting Tool.

The proper way to grind a parting or cutting off tool is shown in Fig. 7. This is a right-hand parting-off tool holder, supplied with the standard blade. In no other form of forged lathe tools is the proportionate cost of maintenance, compared with the effective work done, so great as in the cutting off tool. Consequently, the holder is of economical advantage. The nose of this tool is the cutting edge. Notice in this view the angle at which the tool is ground. The advantage of grinding the cutting edge to this shape will be explained later.

Parting tools must be set properly in the tool post to prevent chattering. The tool must not be set too high or it will ride, or too low as it will dig. It is best to set the tool so the cutting edge will be exactly on the center.

Notice, in Fig. 8, how close the tool is clamped in the tool post. This is very important, as it will prevent the tool from digging into the work. This tool should always be fed by hand, as this permits a more sensitive control of the cutting con-

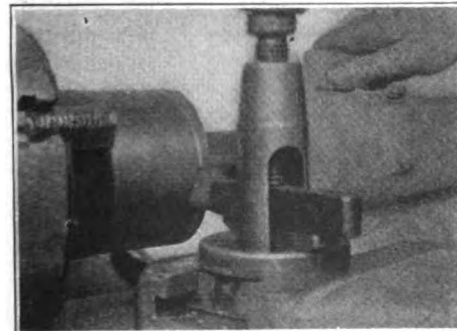


Fig. 9. Facing Interface of Ring With Left-Hand Side Tool.

dition by the operator. The work is usually run at a greater peripheral speed for the square-nose tools than the round-nose tools.

One of the common difficulties experienced with the parting tool is the chattering of the work which, at times, makes it somewhat of a problem to do the job at all.

Chattering may be caused by one of following conditions: (a) Tendency of the tool or work to spring; (b) tool set too high; (c) cross slides loose on ways; (d) looseness of lathe spindle; (e) peripheral speed of work; (f) feed of tool; and (g) angle of top rake on tool.

To eliminate chattering on a job the possible solution is to inspect for conditions as reviewed, but frequently it will be found that it is impossible to eliminate chattering. In this operation, Fig. 8, the ring is partially cut—that is, the parting tool is fed into the casting within $1/32$ -inch of severing the ring. This is done to make it

1. Chuck and center ring pot.
2. Face end.
3. Bore inside.
4. Turn outside diameter.
5. Part ring.
6. Layout ring ends.
7. File to layout lines.
8. Peen inner surface.
9. Compress ring and wire.
10. Clamp compressed ring to face plate.
11. Test position of ring on face plate.
12. Turn to cylinder diameter.
13. Test in piston groove.
14. Lap to proper size.
15. Place on piston.

Necessary Operations to Make Packing Rings on Engine Lathe.

possible to face the side of the ring before it is cut free from the tub.

Face with Side Tool to Save Time.

The operation of facing with a side tool in order to save time is shown in Fig. 9. Notice the left-hand side tool cutting the inner face of the ring. In doing the job in this way, considerable time is saved, as it is not necessary to make a special mandrel or fixture to hold the ring for the facing operation. The ring must be faced to width as closely as possible, gaging this measurement from the groove in the piston. The side tool should be fed by hand and its cutting action controlled with the longitudinal and cross-feed handles.

Our next operation is to part the ring clear from the tub. Fig. 10. This is done by replacing the parting tool, adjusting it carefully in the groove so it will cut on the ridge left in the bottom of the groove with the side tool. Care must be exercised when the tool is cutting "through."

A very slow feed should be used giving the tool plenty of time to remove all the spring in the work before it starts through the stock. To do this will save time, as many rings are broken because the oper-

ator tries to crowd the tool just before the cut is finished.

This illustration gives a good opportunity to see why the tool is ground at an angle. Notice the fin left on the tub,

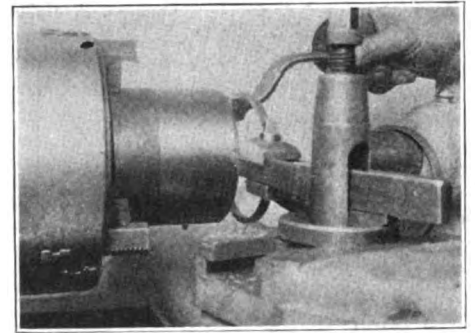


Fig. 10. Parting the Ring Clear From the Tub.

while on the ring the cut seems to be free from an uneven edge. This condition is made possible by the parting tool being ground in this manner.

After the ring is parted from the tub, the cutting operation is continued until the fin is entirely removed from the tub. A radial cut is then taken over the end to insure a true, even surface. These operations are continued until as many rings as are needed are cut from the tub.

Laying Out the Ends for Cutting.

Our next operation is to lay out the ring joint. To prepare the surface of the newly-turned ring so the layout lines will show up clearly, an application of coppering solution is made with a clean piece of waste.

Coppering solution, used for coating surfaces in order that layout lines may be more clearly established, can be made by the shop mechanic. Men who do considerable layout work always have a bottle of this solution handy. It is made by taking a 6-ounce bottle and filling it two-thirds full of rain water, adding all the copper sulphate, blue vitriol, it will dissolve. The solution is made to attack the metal by adding 10 drops of sulphuric acid.

After leaving it set for a few hours, try out some of the solution on a piece of steel or cast iron. If it does not attack the metal and give it an even coating of copper color, add a few more drops of acid.

This solution should be applied only to

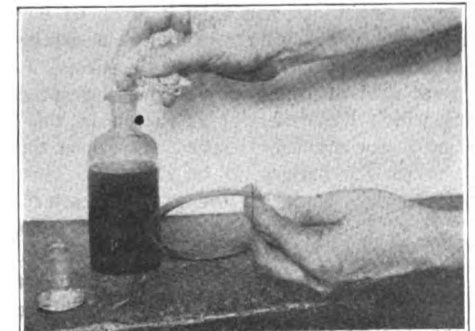


Fig. 11. Apply Copperas Solution for the Layout.

Practical Ways to Adjust Third Brush

In This Article the Adjustment of the Third Brush Will Be Dealt With Mainly—Several Different Designs and Styles Used—Some Things Which Should Be Done on Generator Before Making Setting on Third Brush

By J. R. Bayston

President, Chicago Automotive Institute

In an article that appeared some months ago in this publication, the peculiar action of the armature relative to the third brush was taken up in detail. In this article, we will deal mainly with the adjusting of the third brush.

There are several different designs and

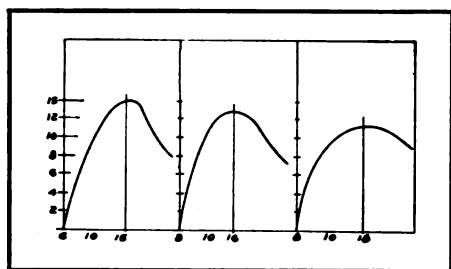


Fig. 1. Three Charts Showing Output of Three Different Generators.

styles used, to easily accomplish the moving of the third brush on a generator. However, practically every generator has its third-brush construction somewhat smaller and generally set at a peculiar angle; therefore, it is easily recognized. The reason for the brush being smaller is that it does not handle as much current as the main brushes. The winding of the armature greatly determines the peak of the current output and the rate of increased charge as the generator armature is speeded up.

Fig. 1 shows three charts of the output of three different generators. Each of them rises to practically the same output, yet they rise at a slightly different speed and taper off to a lower charging rate as different speeds are reached. In making a test on any third-brush machine, the armature should be driven at a speed great enough to cause the maximum output to drop.

This point is reached at various speeds. Some generators will show a drop of 900 R.P.M., while others require a speed around 3,000 R.P.M. to cause this drop. A great deal of this depends upon the speed at which the generator is driven in relation to the crankshaft speed; also upon the size of the battery to be charged. This, of course, would be the starting battery.

It must be remembered, however, that the characteristics of the curve—that is, whether it is peaked or runs flat after it reaches its maximum output—will not be changed by adjusting the third brush. The height of the peak, however, will be changed. If the third brush is moved in the direction of rotation in the armature,

the peak will be built up or made higher. If, on the other hand, it is moved in the opposite direction, the peak will be made lower.

Manufacturers have adopted several ways of regulating the third brush. Most manufacturers make this adjustment so that it is easily accessible from the outside of the generator. Some manufacturers make the adjustment so that it can not be moved. This is considered a safety factor with the manufacturer, as some mechanics not familiar with the proper setting will set the brush at too high an output and cause damage to the battery, and possibly burn out the generator armature.

Some of the most popular forms of third-brush adjustments are shown in Fig. 2. Fig. 2-A shows the third-brush holder mounted on a ring, the ring sliding beneath supports. On the outside edge of this ring, a set of teeth meshes with teeth of a smaller pinion. The pinion is mounted on a shaft going through the cover of the generator and ending in a slotted head. If a screwdriver is inserted in the pinion slot and turned, the third-brush mounting ring will be moved, thereby changing the position of the third brush and regulating the output of the generator.

Fig. 2-B shows the third brush mounted on a portion of a ring. This ring is supported by a guide and a locking screw. To make this adjustment, it is necessary to get at the inside of the generator, loosen the screw and move the brush in the desired position with a screwdriver or your finger, then tighten the locking screw.

Fig. 2-C shows another method of regulating the third brush. In this case two guides are provided with a lock screw in the center. The lock screw must be loosened, the brush set to the desired position and then the lock screw tightened.

It must be remembered that every time the third brush is reset, the brush proper should be refitted to the commutator by means of sandpaper.

According to the design of the brush mechanism, the brush would bear in the same plane as originally, but on account of the slight play in the brush holder, it has been found to shift slightly, preventing the brush from bearing on its complete surface. If the brush is not reseated, the output will not stay at the present setting, but is liable to go up or down, necessitating a new adjustment.

When a non-adjustable third brush is encountered, and it is necessary to make some adjustments on it, this can be done by filing off one side of the brush as shown in Fig. 2-C. For instance, if you want to move the brush in the direction of rotation to increase the output, file off the back side of the brush. The back side is filed off in Fig. 2-C. If you want to decrease the output, file off the opposite side of the brush.

You can readily see that this has an effect of moving the brush in the direction indicated by the arrow. As previously stated, it is the usual rule to move the third brush in the same direction to increase the output, and in the opposite direction to decrease the output.

There has been a question as to the direction in which the machine was to operate—especially where a generator is sent to a service station in a disassembled condition. It must be remembered that the third brush always bears a definite relation to the main brushes in a machine designed to rotate in a certain direction.

Reference to Fig. 3, which shows a number of drawings of two and four-pole machines will indicate just what this relation is. In a two-pole machine, such as Fig. 3-A, there are two possible positions

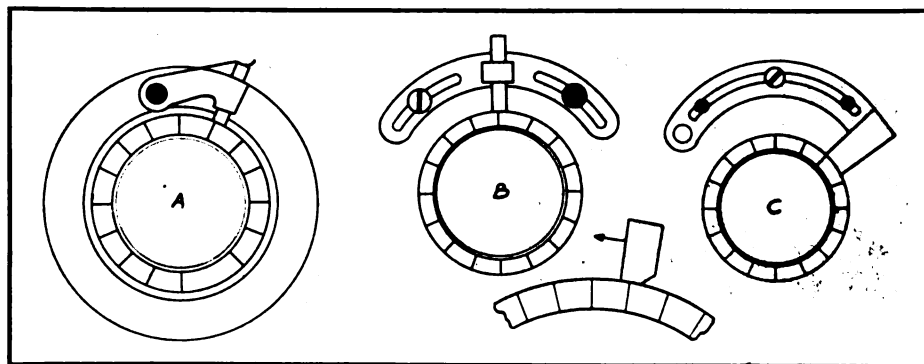


Fig. 2. Showing Some of Most Popular Forms of Third-Brush Adjustment.

for this third brush, as shown by the dotted brushes. The main brushes are shown in heavy lines. If you find the third-brush position is one of the two shown in this illustration, the rotation of the armature will be the same as indicated by the arrow. If, on the other hand, the position of the brush is one of the two shown in Fig. 3-B, the armature should rotate in the opposite direction, or that shown by the arrow.

Figs. 3-C, 3-D, 3-E and 3-F show positions of the third brush on four-pole machines. Figs. 3-E and 3-F show generators in which the third brush bears on the commutator on the opposite side of the main brushes. When a case of this sort is encountered, just imagine that the main brushes are placed on the opposite side of the commutator to which they are now set, and this will determine the position of the third brush relative to the main brush.

Fig. 3-E, as you will note, shows that the third brush is on the left-hand side of the main brush, and the direction of rotation will naturally be the same as in Fig. 3-B. It is necessary to place the third brushes on the opposite side of the main brushes, to avoid any chance of the third brush and one of the main brushes being brought into contact with each other when an extreme adjustment for high output is made.

In Figs. 3-E and 3-D, the third brushes are shown on the same side as the main brushes. This is sometimes used. If it is impossible to get the desired maximum output in a case of this sort, it is sometimes necessary to move the main brushes around a little. However, great care must be exercised, as too great a movement will cause the brushes to spark and the commutator will become dirty. In other words, the main brushes will not become set on the proper peak.

Sometimes it is thought desirable to move the third brush on the machines that have provided no adjustment for it. In a case of this sort, it is best to anticipate accurately the distance required to move the brush before making any changes of mounting.

To determine just where the brush should be set, the brush holder should be removed and a piece of heavy wire gauze, or the brush itself with its pig-tail, attached to the shunt lead wire. Then while the generator is running on the test bench, the third brush can be held against the commutator with the hand and moved forward and backward, the operator carefully watching the output of the machine.

When you find the setting for the desired output, you can then make a mark and mount the brush permanently in this position. When making adjustments on any third-brush generator, it must be borne in mind that the condition of the battery will determine to a certain extent the output of the generator. In other words, if the battery is fully charged, the generator

will have a higher output than if it is in an uncharged condition.

The field current in the third brush, therefore, depends upon the external load or the resistance of the battery that is being charged. If more current is forced through the shunt winding, the output will naturally be higher. This is one disadvantage of a third-brush machine. However, the advantages seem to offset this one disadvantage by far.

If the third-brush generator is set at a certain rate and the battery is discharged, when the battery has been fully charged, the rate will undoubtedly be so high that it will cause considerable damage to the battery. In some cases, the difference of one volt at the battery will cause the output of the generator to fluctuate as much as 25 to 30 per cent. Quite often a change of voltage in excess of one can be had at the battery terminal when the battery has been fully charged. So, if the output does not seem to be proper, it does not necessarily follow that the third brush is at fault.

Certain things should be done on the generator before making the setting on the third brush. If the commutator seems to be black and dirty, it should be smoothed down with sandpaper—never emery cloth, as it is a conductor of electricity—and the mica cleaned out between the segments of the commutator.

In some cases, the generator is driven by a belt. Naturally it should be examined to see that it is not slipping. A generator should produce its maximum output at a point between 25 to 30 miles per hour car speed. If the belt is thought to be slipping, it should be tightened or a hammer handle pressed against it and the results on the ammeter noted.

The tightness of the belt can be tested by

closing the cut-out points by hand. This causes the generator to revolve as a motor. If the belt is loose, it will revolve and the belt will slip on the pulley.

Another precaution before setting the third brush is to make sure that the generator is warmed up. Like an engine, a generator operates at a higher output and with more efficiency after it has been warmed up. An engine will not pull the hat off your head when it is cold. The generator will have a low output when cold.

If, after everything else has been looked over, you find that the output does not come up to the desired point, the third brush should then be adjusted and carefully refitted and the lock screw tightened.

Motor Vehicles in Panama and the Canal Zone.

The comparatively large number of motor vehicles in use in the Republic of Panama and the Canal Zone is due principally to the activities connected with the Panama Canal, and also the extensive use of motor vehicles for hire in Panama City and Colon and the adjacent sections of the Canal Zone, says U. S. Consul Orr, Panama, in a report to the United States Department of Commerce.

The official registration in the Republic of Panama is given as 731 passenger cars, 59 trucks, and 23 motorcycles, while in the Canal Zone there are 1,323 passenger cars and motor trucks combined—the number of each being about equal—and 369 motorcycles.

Official cars make up 658 of the registration in the Canal Zone and are owned by the Panama Canal, the Panama Railroad, and the United States army and navy. There are hardly more than 10 of the registration which are not of American make.

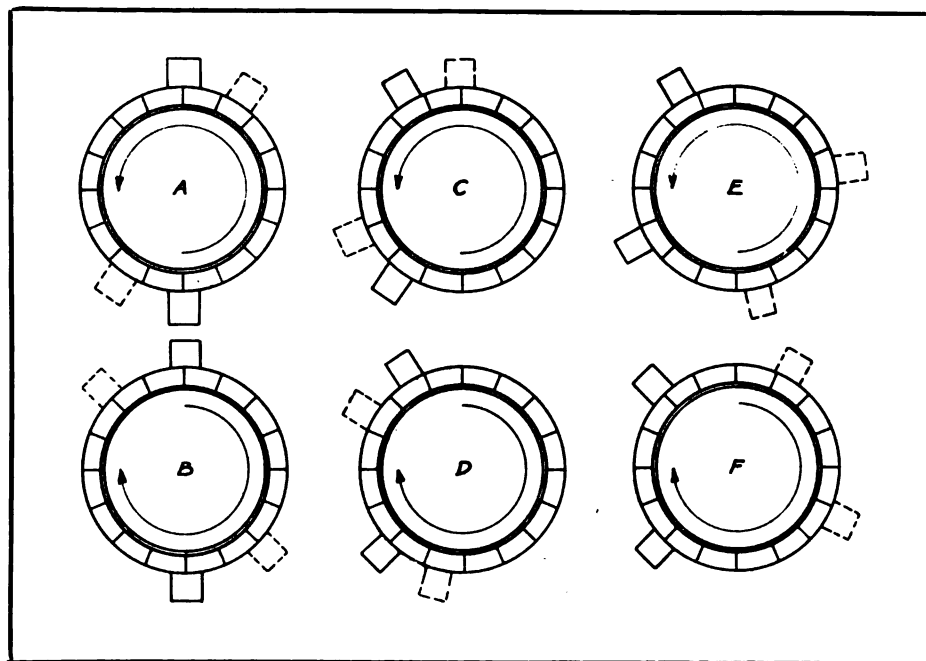


Fig. 3. Two and Four-Pole Machines Which Show Relation of Third Brush to Main Brushes in Machine Designed to Rotate in Certain Direction.

When Tire Retreading Is to Be Done

(Concluded from page 22.)

cient time to cure, Fig. 8, loosen the clamps, pry the sidewalls loose from the mold, and shift the tire to the next position, Fig. 9. About eight inches lap is allowed between hitches. If the gum has made an overflow at the end of the mold, it must be trimmed

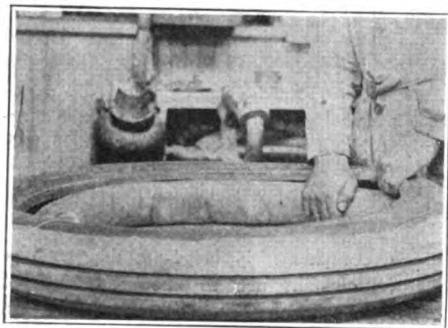


Fig. 9. Shifting the Sand Bag for Second Hitch.

before the next hitch is started. The second and third hitches are accomplished in same way as the first.

Time of cure will vary with the size of tire and the kind of stock used. Between 40 and 50 minutes is the usual period of cure for each hitch. Companies supplying the repairman with material will recommend the period of cure suited to their materials.

If the building-up has been properly done, there should be very little trimming to be done after the cure is completed. In some cases it may be necessary to smooth the joints of the old gum and the new with a rasp or file.

Retread molds may be secured in a variety of styles for non-skids. A very popular type that makes a neat-looking retread is the ribbed tread mold. Some mold manufacturers make molds with a removable matrix or impression plate. This allows the repairman to retread with different designs by changing the matrix.

Retread bands may be purchased ready for use. These are semi-cured and have the non-skid impressions on the outer surface. The tire is built up exactly the same as for camel back or tread gum and the retread band placed as the last part of the repair.

The retread bands are molded to a circle to fit the tire, and their application is somewhat difficult. It is best to cover the cushion stock with holland before slipping the retread band on. After the band is centered, the holland may be removed and the band pressed in place. After this the remainder of the repair is carried on in a manner similar to the methods followed in using camel back or tread gum. Bands of

this kind are rather difficult to cure in the 1/3-circle mold. If the repairshop affords a steam kettle, this type of retread is very convenient.

Retreading is an art in itself, but the repairman who has mastered the other phases

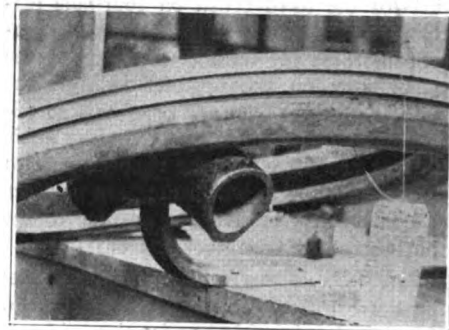


Fig. 10. The Completed Tread.

of the repairwork should have no difficulty in turning out neat and serviceable retreading. Fig. 10 gives an idea of the appearance of the completed tread.

[EDITOR'S NOTE—In last month's article on tire repairwork an error was made in the title of one of the illustrations. The title should have been "Fig. 1. Cutting Down Cord Tire for Three-Quarter Lay Back."]

Making an All-Year-Around Profit

Late Fall Often Brings the Problem of How to Keep the Shop Supplied with Work During the Winter Months—Overhauling and Rebuilding Jobs Plentiful and Profitable for Shops with Reasonable Amount of Equipment

The busy summer and early fall months are nearly always more or less profitable to the average automotive repairshop, but with the late fall, the annual slump in business comes, which means that a little later the shop will either be closed entirely or run at a loss.

It is this annual winter loss that takes the heart out of so many repairshop owners and makes them feel that the shop does not pay. The most pathetic part of this condition is that it is so utterly needless where the shop has a reasonable amount of equipment, or where the proprietors can command the necessary capital for adding sufficient equipment to do overhauling and complete rebuilding.

There never was a time when there was so much of this work to be done—never a time when there were so many cars in sorry need of overhauling and rebuilding, to say nothing of the trucks and tractors that in themselves mean an untold amount of work.

In addition, the people are continuing to

practice the strictest economy. They are not buying new cars and they would not knowingly run their old ones in a dilapidated and wasteful condition if they were properly approached in the matter of rebuilding for economy.

Here is a plan that has been worked to mighty good advantage by a number of repairmen:

Instructions are given the shop foreman to check and report, on a separate card, the general condition of each motor that he works on. Whether he simply cleans out the carbon or opens up the motor for any other purpose, he measures the cylinders with a micrometer and records the exact size, wear and taper of each. He also makes notes of any scores or blemishes of any kind and determines whether valves or tappets are in bad condition. He also makes notes of the condition of the clutch, gear sets, rear axles, etc., and notes any particularly loose bearings or noisy operations.

So, when Jones, in the fall of the year, drives up for gasoline, the garageman

glances at his card and has plenty of ammunition with which to tackle him on securing a complete winter overhauling job. He goes out and engages in conversation with Jones something about as follows:

Garageman: "Good morning, Mr. Jones. How many today?"

Mr. Jones: "Oh, give me about ten and a quart of oil."

Garageman: "She sure is getting to be an old gas eater, isn't she? You remember the time you had her in here last spring to grind the valves? The cylinders were six to eight thousandths out of round then, and she must be quite a little more now the way she sounds. Besides the bearings are quite loose and there are a lot of other things that need to be checked up. What you want to do, Mr. Jones, is to let us enter your order for a winter overhauling job. Bring it in at the time you are ready to lay it up. Let us go through the old boat thoroughly and rebuild it completely and we can make her as good as new and

Please Turn to Page 39.

Welding, Cutting and Brazing Practice

Student Welder Should Have Knowledge of Nature, Components, Capacity and Limitations of Oxy-Acetylene Welding Flame—Three Divisions of the Oxy-Acetylene Flame—Flame Size Regulation Described and Illustrated

By David Baxter

The student welder should learn something about the oxy-acetylene welding flame before he is taught to manipulate the torch in actual welding practice. He should learn something about its nature and compo-



Here is Shown the Torch When First Lighted, Producing the Large Yellow Flame, Purely Carbonizing.

nents and something about its limitations and capacity before tackling the proposition of actual fusion of the different metals.

This is sometimes not the custom in various welding schools over the country where the beginner is handed a torch, shown how to light and regulate it, and then given practice work in flame manipulation. Thus he comes from the welding school poorly equipped for the handling of a general line of repairwork.

Therefore, it will be the purpose of this article to endeavor to show the novice some of the things that are not usually taught to apprentices, as well as how to regulate and judge the welding flame.

In the first place, he should know that the heat of the oxy-acetylene flame is extremely high in melting quality although very small in size. In fact, it is this odd



Another Step in Flame Regulating. The Excess Acetylene or Carbonizing Flame.

combination which make it the valuable tool it is.

The intense heat confined in such a small flame makes it possible to do welding that could not be done with a large flame of lower temperature. Were it not possible to confine the heat to a very small spot on

the job it would be impossible to repair much of the automobile work that is now being welded, because a large flame would melt too much of the casting or probably destroy it.

Although no larger than the ordinary flame of a match, the oxy-acetylene welding flame has an approximate temperature of from 6300 to 6500 degrees. This is an intense temperature, although a small amount of heat, and the beginner can readily conceive the capacity of the flame—he must realize also the limits of it.

In other words, it is possible to heat one spot to a very fluid state in a few seconds but the flame must be manipulated deftly in order to keep a larger area fluid. Even then it is not possible to keep it hot without the aid of other heat.

The oxy-acetylene welding flame is in reality two flames—the outer envelope and the inner cone. Both of these are necessary but only one actually does the melting. The outer brush or envelope acts as a sort of protector to the inner cone as it prevents the oxygen of the atmosphere from attacking it. It also is some protection to the molten weld since it tends to prevent the oxygen of the air from reaching the melting metal.

If properly manipulated, the outer flame can be used to a great advantage by the welder to prevent or at least minimize the oxidization of the melting weld. By holding the torch in such manner that the outer brush of flame spreads out over the surface of the fluid metal, the atmospheric oxygen is taken up before it can reach the bath.

The envelope flame is the result of incomplete combustion in the welding flame and by the combustion of the atmospheric oxygen and the carbon of the flame. It surrounds the white cone and extends beyond it for several inches—more or less according to accuracy of the regulation. It is also known as the secondary or final stage of the combustion, but it should take very little oxygen from the flame supply because if it does, the flame is not burning economically. Enough oxygen should be supplied from the tank for the combustion, but no more. The outer flame should take its oxygen from the air.

The inner or bluish-white cone of flame is the primary stage of the combustion. Theoretically, it requires $2\frac{1}{2}$ volumes of oxygen to completely burn one volume of acetylene, but this is actually what takes place if one takes into account the oxygen taken from the air during the phase of the combustion. The torch need supply only

the oxygen necessary to form the inner cone and, for this, the volume is exactly one volume to one volume. In every-day practice it requires a little more—about one and two-tenths for one, because the mixture of



When the Acetylene is Decreased After the Oxygen is Turned on the Flame is Still Carbonizing.

the two gases is not absolutely perfect.

The inner cone of the flame when it is correctly adjusted is the part with which the melting is done. In fact, only the extremity of this inner cone actually does the melting; that is, the tip of this white cone is the hottest part of it. From this it may be deduced that the flame should ordinarily be held so that it barely licks the surface of the metal. It should scarcely ever be plunged directly into the molten mass.

For welding purposes there are three distinct divisions of the oxy-acetylene flame, only one of which should be utilized by the beginner. Perhaps it should be said that there are three distinct flames, only one of which is fit for welding unless the operator is an expert and then but sparingly. This has been termed the neutral flame, but might well be termed the half-way point



The Oxidizing Flame Which Carries Too Much Oxygen.

between the other two divisions. Of these, the one is known as the carbonizing flame and the other as the oxidizing flame. Each derives its name from its peculiar tendencies.

Perhaps it should be said of the oxidizing and carbonizing flames that there are sev-

eral graduations of each; that is, between the oxidizing flame in its strongest form and the strictly neutral flame there are numerous grades. The same is true of the carbonizing flame. In fact, it is difficult to obtain and keep a strictly neutral flame. One or the other elements of the flame is usually in excess. Unless the torch operator is particularly expert, the flame is usually off one way or the other a very slight degree. However, all care should be taken to keep the flame as strictly neutral as possible.

The carbonizing flame is also termed the excess acetylene flame, which is due to the fact that it carries more acetylene than oxygen. In other words, all of the carbon in the flame is not consumed by the combustion.

The acetylene gas is rich in carbon—it is practically all carbon in a pure grade of acetylene. This excess of carbon is absorbed by the molten metal, with the result that the metal is harmed more or less. In other words, it is carbonized, which accounts for the name "carbonizing flame." The metal is rendered hard and brittle by the absorption of the carbon.

The oxidizing flame is the opposite of the carbonizing flame and is termed the excess oxygen flame. It is caused by too much oxygen. All of the oxygen is not consumed by the combustion and, therefore, part is carried to the molten metal to cause it to oxidize. Oxidizing is but another name for burning which causes the metal thus attacked to be brittle and porous, according to the amount of oxygen absorbed. Some metals are more easily affected than others by the action of the flame.

A slightly oxidizing flame is really a little hotter than the neutral flame but the danger of ruining the metal is greater and therefore, it should not be used except in very special cases.

An excess of acetylene lowers the temperature of the flame and, in proportion, lowers the melting quality of it. It is scarcely ever used on aluminum or other metals of low melting point. Even then it is better for the student to employ the strictly neutral flame as nearly as he can obtain it.

The strictly neutral is the hottest flame obtainable and carries the least chance of harming the quality of the metal welded. In theory, it carries neither element in excess of the other. The oxygen and acetylene are entirely consumed by the process of combustion. The tip of this flame is the hottest part of it and, therefore, does the most of the melting. The carbon is all used up by the oxygen and neither one can reach the molten bath of the weld. Of course the welder can ruin the weld with a neutral flame by poor manipulation but there is less chance of it.

To obtain the flames which have been mentioned, the torch valve controlling the acetylene is opened first. It is useless to open the oxygen first because it will not burn. The acetylene regulators should be set to supply the correct pressure before

lighting the flame. Then, immediately after the torch valve is opened, a light is applied to the escaping acetylene; do not apply the torch to the lighter and then open the valve because this is hard on the regulator seat and diaphragm due to the premature igniting of the flame.

As soon as the light is applied to the escaping acetylene it bursts into a long yellow blaze with black smoke tipping the end and sides. This is practically useless to the welder as it is nearly all carbon so it should be changed immediately on account of the great waste of acetylene. The change is made by turning on the oxygen and cutting down the acetylene.

Each one is cut down gradually until the smoke disappears and the flame loses its yellow color. As the pressures are regulat-



The Neutral or Standard Welding Flame Has Neither Element in Excess.

ed, the flame becomes straighter and whiter, although still several inches long, with ragged tongues at its extremity. It is still a carbonizing flame and still unfit for welding purposes.

Then the flame is drawn back still farther by manipulating the torch valves, increasing and decreasing the gases. The flame now becomes shorter and sharper with tiny quivering tongues. It also changes its color to light blue and is wider near the center of its length. It is still unfit for welding as it is not yet hot enough and contains a high percentage of carbon.

In arriving at these three stages of flame quality it will be noticed that the intermediate stages are almost numberless. It is of no use to try to use any one of these for welding. The neutral stage is very close, only a slight turn of the torch cock being required to bring the neutral flame out. Here

the two valves should be turned very slowly and carefully in order to regulate the flame to strictly neutral.

As the valves are regulated, the flame seems to be drawn back into the torch. It gets shorter and more blunt and changes again to the pure white color. When it reaches the neutral stage it will be almost straight, slightly coned, and round at the end. In the average torch, it will be approximately $2\frac{1}{2}$ times as long as it is wide. So long as it is neutral, there will be no flickering or little tongues showing but the flame will burn steadily for hours.

However, the welder should not take for granted that the neutral flame will remain neutral throughout a long job of welding. Several things tend to cause it to change. The heat of the weld may cause the welding tip to expand and thus change the flame. The torch valves may be accidentally turned and cause the change. Some obstruction in the mixing chamber or the torch tubes may throw the neutral flame off a trifle. Or the regulators may be leaky or in otherwise poor condition and thus result in a changing flame.

Therefore, it will pay the operator to watch his flame continually for any little fluctuation in its condition during the welding process. When not certain about it, he will do well to test the flame by shutting off the acetylene and then again going through the regulating process.

We have now seen that the oxidizing flame is one where the oxygen predominates, and the carbonizing flame is one where the acetylene is the strongest. We deduce from this that the neutral flame is one where both elements are equal.

When the neutral flame is shortened until it still shows the central cone, although it is sharper and not so white, we have again reached the oxidizing stage. The oxygen pressure is the stronger and the flame is an oxidizing one. The different stages as we described are shown in the illustrations.

Before taking up the subject of manipulating the welding flame, it may be well for the student to remember that the size of the flame varies with the size of the nozzle or welding tip. The large tip makes a large flame and vice versa. But the manner of adjusting and maintaining the flame is the same for all sizes.

The size of the flame is determined by the thickness of the metal through which the weld is to run—that is, the size of the welding tip is selected by the thickness of the metal. Instructions for this are usually furnished by the manufacturer, since the torches vary somewhat with the design and make.

In theory, each flame size requires a certain amount of gas. The regulator is set for a certain amount of gas for each tip. This rule should be followed as closely as possible, but the expert operator will often use one size flame for several thicknesses, which may be done by a clever manipulation of the torch. The flame is advanced

or retarded—or is held at different angles—during the melting, to produce the effect of changing the tip.

Some torches will not burn steadily when overheated but will go out with a sharp cracking noise. This is termed "backfiring" and is caused by premature ignition. The gas ignites in the interior of the welding tip or in the tubes. Sometimes backfiring is caused by a bit of slag or molten metal flying up and adhering to the outlet of the tip. It is liable to happen to any torch.

The bit of slag shuts off the flame long enough to change the balance of the gases and one becomes stronger than the other, thus permitting the ignition to enter the tip. If the popping noise continues, the tip should be cleaned. It is poor practice to scrape the tip on the welding table or the casting as it is likely to damage the outlet. The safest way is to shut off the flame and clean the end of the tip by hand.

With the modern torch this backfiring is no longer dangerous but it sometimes interferes seriously in flame regulation when welding a particular piece of work. The neutral flame will not prevent it but it will go a long way toward eliminating the trouble since the neutral flame causes less slag formation and burned metal, and, therefore, less flying particles.

It is evident, then, that, while the expert torch operator may save time by employing a slightly carbonizing or an oxidizing flame, the safest flame for the beginner is the standard neutral flame.

Brazilian Automotive Imports Decrease Ninety Per Cent.

The Brazilian imports of automotive products decreased in 1921 to about one-tenth of the imports in 1920.

Consul General Gaulin, in a dispatch to the U. S. Department of Commerce, attributes this decrease in a large extent to the exchange depreciation in Brazil which resulted in an increase in prices of 148 per cent above the 1920 level. In 1920, he states, about 91 per cent of the number of cars imported were of American manufacture, while in 1921 American products amounted to only about 41 per cent of the total.

In 1920 Italy, France, and Germany began to come into the market again, and Italy is the only one of all the countries exporting automobiles to Brazil that showed an increase in 1921 over 1920. However, American cars are the most popular in the district and when conditions become normal again importations from the United States should be made in increasing quantities.

The decline of imports, especially in the case of the United States, was due in part to the large stocks on hand at the close of 1920, which could not be sold on account of the high prices, and sales in 1921 were even made at a loss in order to liquidate these stocks.

MAKING AN ALL-YEAR-AROUND PROFIT

(Concluded from page 36)

she will run on half the gas and half the oil you are using now."

Mr. Jones: "That is not a bad idea. I will bring her in later."

Garage man: "About what time do you think you can bring her in? You see we are going into this winter overhauling and rebuilding heavy and, in order to avoid any confusion later in the winter, we are entering the orders as we get them so we can plan our work more intelligently. By

having the actual orders we know just how many jobs we have to do and we can plan our work and stock much better. We could likely get at yours about Christmas time. Could you bring it in about that time?"

Mr. Jones is pretty apt to say, "I guess that will be all right," and allow the written order to be entered.

Sometimes the garageman must use a little more salesmanship than this. He can point out how much the customer is losing by running his car in bad condition. He must picture how inconvenient it would be to have the car break down during the busy spring and summer months.

He can call the customer's attention to the fact that he can do the work better and cheaper during the winter—better because he can give it his own personal attention, and because they are not rushed with other work as at other seasons of the year and can give it their undivided attention and continue without interruption. This would naturally make it cheaper because of the greater efficiency.

Neither the time nor space is as valuable in winter as it is during the rushed summer months. Any repairman having space that can be partitioned off to give a small, sufficiently heated shop, and having a reasonable amount of good, up-to-date equipment, can go into this business and can make more money than he is doing in the rushed summer months. But it takes backbone and solicitation.

An average winter overhauling or complete rebuilding job will run from \$40 to \$250, depending upon the make of car and the amount of work done, but these jobs must be solicited just the same as you would solicit the sale of a car.

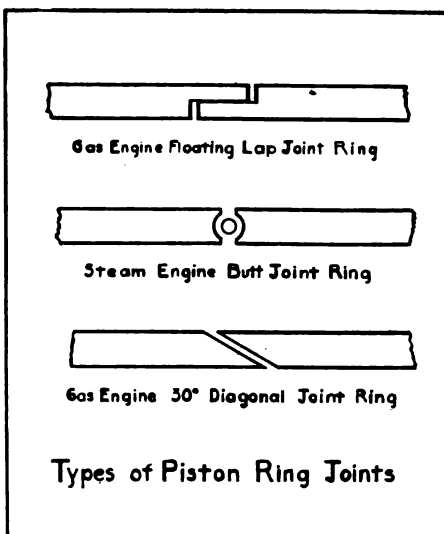
Making Packing Rings for Automobile

(Concluded from page 33)

polished surfaces, free from grease. Apply the solution as shown in Fig. 11 and, if a bright copper coating is not obtained, make another application of the solution on the surface and scour with fine emory cloth. During this operation a few more drops of the solution should be applied to get a uniform coating.

There are three common methods of splitting piston rings—the lap joint, the butt joint and the diagonal joint. The butt joint is used for steam engine pistons. This joint is not tight enough for the gas engine. The lap and diagonal joints are common to gas engine practices.

The lap joint makes much the tighter joint of the three styles shown in Fig. 12. It is not universally used on the smaller rings for the reason that the ends are narrow and delicate. The diagonal joint varies from 30 to 45 degrees and usually is cut at a 30-degree angle. The objection to this method of splitting rings is the ease



Piston Rings Must Be Split to Permit Compression of Ring.

in which gas leakages occur through the joint.

(To be concluded)

New Tires Valuable Asset in Selling Used Cars.

A new set of tires will work a remarkable change both in the appearance and easy-selling qualities of second-hand automobiles.

"A hundred dollars' worth of new tires will enhance the selling value of the used car at least \$200," declared a dealer.

Unsatisfactory appearance will frequently overshadow the merits of the automobile.

"Taking it all in all, a new set of tires and a little cleaning up of the car itself will accomplish the same results for the old worn car that a shave and a haircut and a new pair of shoes will do for the man with an old suit of clothes."

Practical Hints for Shop Mechanics

"Hot Water On Cold Mornings."

"Ten below zero! Think of starting all the storage cars! Some job!"

That is what mechanics in many garages in this country think every cold morning. It is the same thing every day, and something of a task.

Most of the smaller garages are not heated throughout. The workshop and office get the heat, but the storage room is cold. The reason is very simple: It entails too much expense to heat a large room like the storage room for what little return storage on cars brings. These small establishments cannot afford it. Nevertheless, these same garages shelter cars every cold night throughout the winter. Then the problem of starting the cold motor comes up.

With zero weather it is impossible to fill the radiators of these storage cars with cold water; they would freeze immediately. Besides, there is the starting. Most small towns have no water works. There is no hot water available unless special arrangements are made for it. That is why the mechanic looks forward to the winter months with a wry face.

Possibly most car owners still remember experiences they have had in starting the cold motor. It isn't altogether a pleasant memory, for I have been there. It often-times means that cranking must be resorted to, and then the blisters appear. You feel about like the weather. The thermometer of your disposition reads ten below, and sometimes more. It's perfectly natural. Then, can you blame the workman who has to face a morning of starting storage cars without a heated storage room, or any hot water?

This is a problem that faces the small garage owner and yet it can be easily solved. I remember that several years ago a certain small garage in a town of about 500 tackled this problem. They had 10 or

15 regular storage cars. These had to be started the first thing every morning. The winter in this section did not happen to be very mild. It was something of a task.

At this time the workmen were heating water for the cars by setting a 5-gallon can of water on the top of the office heater. It took considerable time and did not heat much water and, together, it was a slow

ONE DOLLAR EACH

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

and exasperating process—even an onlooker could observe that.

A short time ago I visited this same garage. Many improvements had been made. I particularly recalled the water problem. I wondered how it had been solved. I looked about and found the answer.

The storage room was still unheated, but the workshop at the rear of the building contained a large coal heater. This kept the shop cozy and warm on the coldest days. There was heat to spare. This spare heat was utilized to advantage. I noticed it almost at once.

A large vinegar barrel had been placed on a stand back of the heater in an out-of-the-way corner. A space of about three feet separated the stove and barrel. This stand, upon which the barrel rested, was the same height as the base of the heater, making the body of the heater almost level with the barrel. Two 1-inch holes had been cut in the side of the heater, about a foot apart, and above the fire-box lining.

Parallel with the holes in the heater, two 1-inch holes had been bored in the side of the barrel. A three-foot piece of galvanized pipe spanned the distance from barrel to heater, one end being fastened in the barrel and the other projecting through the side of the heater. On the inside of the stove 1-inch elbows had been fastened to the ends of the two three-foot pieces of pipe and another piece 12 inches long had been used to connect the two elbows, thus

making a complete circuit from the barrel through the stove and back to the barrel. These elbows had been turned on with pipe wrenches, so that it was water tight. The ends fastened in the side of the barrel were left open.

Water was placed in the barrel every morning when the fire was built. The heat caused the water to circulate through the pipes and hot water was soon supplied for every motor in the garage. Any moment of the day hot water was ready for the garage patrons.

The barrel was kept full, and there is no worry now about getting the cold motor started. This improvised water heater had solved the winter morning problem for this garage. I think it will be of use to many others.

Besides the saving of time and workmen's patience, it is inexpensive. One barrel, seven or eight feet of 1-inch pipe, and two 1-inch elbows. Isn't it worth the expense?—R. D. G. Mont.

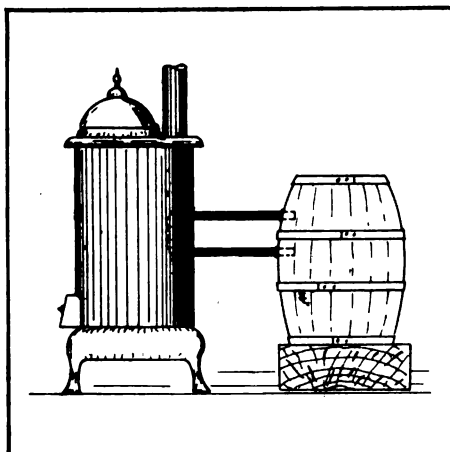
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A Leaking Valve Stem.

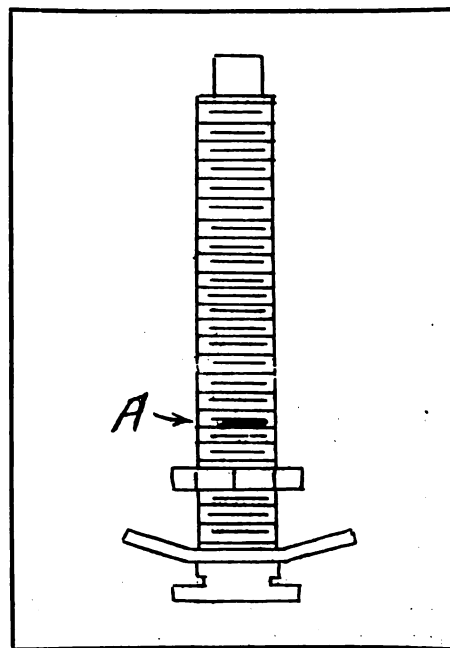
Recently I found a valve stem in an automobile tire which had a hole worn in the side, caused by rubbing the rim while running flat on the tire.

As I didn't have a new one, I cleaned the stem around the hole *A* by filing it bright, applied a little Nokorode and a drop of hot solder over the "wound," being careful that the solder flowed evenly and stuck all around the hole.

This was an entirely satisfactory job, for the tire is still running with the same valve and it never leaks at all.—G. M., R. I.



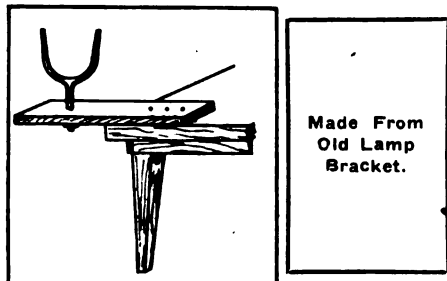
Provides Hot Water on Cold Mornings.



Repairing Leaking Valve Stem.

Bracket for Tire Repair Work.

An old lamp bracket, of the double-prong type, makes an excellent support for tire and casings while being repaired. A short strip of wood is nailed to the bench, one end overhanging as shown. The bracket is



Made From
Old Lamp
Bracket.

fastened to this end and the tire or tube hung in the fork, when working upon them.—L. R. B., Iowa.

* * *

Re-turning Battered Threads.

Sometimes it is necessary to chase the threads on the axle shafts after removing the rear wheels, before the nut can be placed on, being caused by battering the threads to get the wheels removed.

In some cars, such as the Maxwell, Studebaker, Dort, Overlands, etc., the keyways are deeper than the surface of the axle, making it impossible to chase with a die the threads on it.

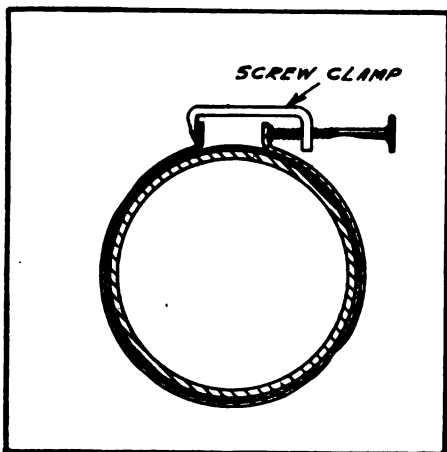
By taking a short piece of another key, grinding it down to the depth of the keyway in the threads, the die will take over this, as it will be the same height as the other part of the axle threaded, thus making it easy to chase the threads and not remove the axle shafts from the car to do it.—G. F. H., N. C.

* * *

Brake Lining Hint.

Instead of spending several dollars for a machine to reline Ford transmission bands, we made one from an old transmission drum.

The drum is either clamped in the vise or, better still, a permanent bench bracket is made at the forge. Then the lining and the band are clamped around it with an



Useful When Relining the Ford Transmission Bands.

ordinary screw clamp. It is then a simple matter to drive the rivets and let the drum do the spreading.—R. A., Minn.

* * *

Used Gasolene for Oil Burner.

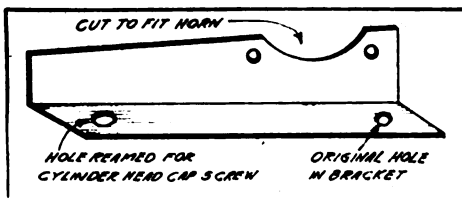
We have no fuel gas in our small town and have had trouble with the vulcanizer because of inability to secure the proper grade of gasolene needed to burn in the burner. It produced so much carbon that it was necessary to clean the flues many times weekly.

We finally decided that we would try one of the many coal oil burners which are advertised in the papers, but when it arrived found that it needed a brick enclosure built up around the boiler to prevent smoke—and much of it. Not having time right then to enclose it, we tried the coal oil burner with gasolene and it made the best heat we have ever had. It burns quickly, gets very hot and there is no smoke or carbon.—L. A. H., Tex.

* * *

Horn Bracket.

It is sometimes desirable to fasten a motor-driven horn to the Ford car but, if the horn was not equipped with a special bracket



Home-Made Horn Bracket for Ford.

at the factory, it is quite a proposition to make one.

We find that one made in the manner shown in the illustration is a very satisfactory substitute for the factory-built article. Get a Ford dash bracket No. 3640 c—a broken one will do—and cut it in the shape shown.

It is only necessary to drill two holes and ream a third large enough for a cylinder-head bolt.—D. & F., Mo.

* * *

A Vulcanizing Trademark.

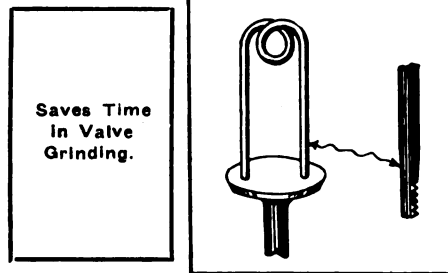
Most vulcanizers guarantee their work and repair, free of charge, any casing that does not hold after they have repaired it once. However, unscrupulous customers will sometimes impose on the honest repairman by bringing in an unsatisfactory repair that was done in some other shop.

As a means of identifying all work from the shop, it is advisable that the vulcanizer adopt some mark or initials that stamp the work of the shop.

This may be done by stamping the mark or initials on each mold and plate. The rubber, while curing, will flow into the depressions and plainly mark the tire or tube. As a matter of taste, the initials or mark should be reversed on the mold, making the mark appear on the work in its natural position.—R. B., Mich.

Ford Valve Lifter.

When grinding the valves of a Ford motor some little trouble is often encountered in lifting the valves from their seats. The tool shown in the illustration will prove very convenient and will save con-



Saves Time
in Valve
Grinding.

siderable time while the grinding is being done.

A piece of 3/16-inch spring wire, about 14 inches long, should be bent as shown. The ends should be cut down so that they will enter the holes on the head of the valves and the outer sides should be notched so that they will secure a hold on the sides of the hole.—S. E. G., Iowa.

* * *

Ford Transmission Cover.

Here is my method of removing transmission cover on a Ford car equipped with starter, without removing the starter from the cover.

With a saw, remove a bit of cowl board directly over the starter. This will permit the whole assembly to be lifted free of the flywheel.

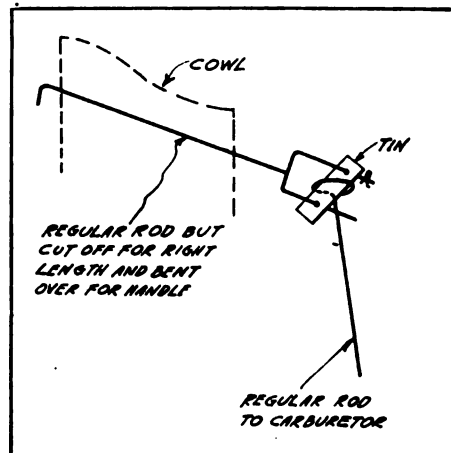
In replacing, see that the pinion on the Bendix drive-shaft is at the extreme end.—R. C. S., Tenn.

* * *

Carburetor Control.

Especially on cars with starters or Fords the control is hard to reach.

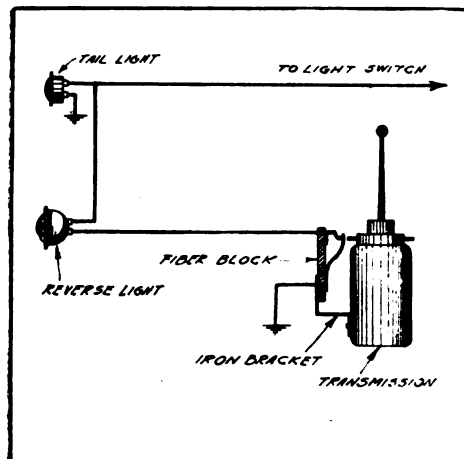
Get another adjusting rod and a small piece of tin, as shown in the illustration, and assemble. Insert the piece of tin through the rod No. 1 and then rod No. 2 through the tin, and insert a cotter-pin, for which the hole is already there. This acts as a universal joint and the carburetor may be more easily adjusted.—E. S., Iowa.



Acts as Universal Joint and Makes Carburetor Adjustment Easier.

Automatic Reverse Light.

A small spotlight or side light is fastened to the rear of the car, so it will light the road to the rear when going backwards. It is wired as is shown in the diagram.



Wiring for Automatic Reverse Light.

The automatic switch is made of a fiber block, with spring brass contacts. A suitable iron bracket is made to fasten it to the transmission in such a manner that the end of the gear-shift fork will close the contact points when the gears are in reverse.

By connecting the lamp to the tail-light wire, as shown, the automatic switch will light it only when the other lights are on.—P. A. B., Pa.

* * *

Novel Use for Spray Gun.

The low-grade fuel used in the automobiles of today is largely responsible for the starting difficulties that some owners experience when their motors are cold.

This is due to the fact that the gasoline enters the cylinders in a raw, liquid, and almost incombustible state.

To overcome this condition, many owners prime the motor through the priming cocks before attempting to start, but this wet gas in the cylinder often does more harm than good.

Where it is advisable to prime an engine, do so with a spray gun. It will be found to be much more efficient and effective than

the squirt can that is usually employed. When a spray gun is used, the gas will enter the cylinders in a highly explosive vapor state, thereby making starting easy.

For this reason alone no garage should be without a spray gun but, in addition to this, they are useful in spraying paint on inaccessible places, cleaning greasy parts with gasoline spray, and oiling springs.

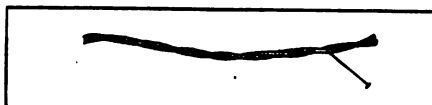
A simple form of spray gun is shown in the illustration, to be used in connection with compressed air.—G. F. S., Ill.

* * *

To Determine Wire Polarity.

Occasionally it is desirable to ascertain the polarity of one of the wires of an electric circuit without having to trace it to the source of supply, an instance of this being the installation of a spotlight, and for which the positive side of the circuit is taken from one of the wires leading to the horn button.

These wires are often twisted together in a manner similar to an electric-light drop cord, and it is rather inconvenient to determine the polarity of the wires mid-



Pin Inserted Through Wire Installation.

way of their length. In a case of this kind, it is very easy to ascertain the polarity by inserting an ordinary pin or needle into the wire installation far enough to touch the copper conductor.

Then, by using a suitable voltmeter, and testing to ground, the wire desired can be very quickly located. The illustration shows the way in which this is done.—E. K., Minn.

* * *

Everybody's Wheel Puller.

Especially for the average car owner who has no wheel puller, for Fords, and for the garageman who does quick work is this shop hint intended.

When the wheel sticks, put the lever in high, take off and reverse the nut, and turn back flush with the axle and hit with the hammer. There is no danger whatsoever of battering up the threads, as the nut keeps the axle from spreading and, when turned off again, your threads are in good shape.

A few sharp hits will bring the wheel off 99 times out of a hundred, as the jar is direct.—E. S., Iowa.

* * *

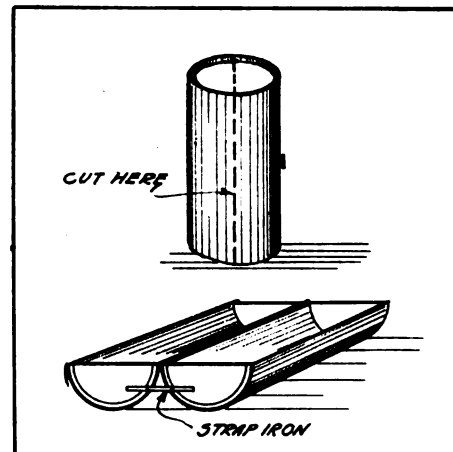
Trimming Rough Edges from Tape.

Friction tape has a disconcerting way of sticking along the edges when it is unrolled, making a feather edge. This may be prevented if the ends of the roll are smoothed with an old rasp or file.

The roll may be made still more convenient by marking the end of the roll into segments with a sharp knife. The tape is easily broken from the roll at any one of these marks.—L. R. B., Iowa.

Handy and Inexpensive Wash Tank.

Here is one that is real handy and inexpensive. It is an engine wash tank. Take any steel barrel and cut as shown in the illustration. Then pull apart and bend



Steel Barrel Converted to Engine Wash Tank.

away down. It will make a tank four feet square. Strap iron can be welded on to suit.—C. A. M., N. Dak.

* * *

For Lifting Cylinder Heads.

A useful tool for lifting cylinder heads from blocks may be made from an old spark-plug shell, three short pieces of pipe and a pipe tee.

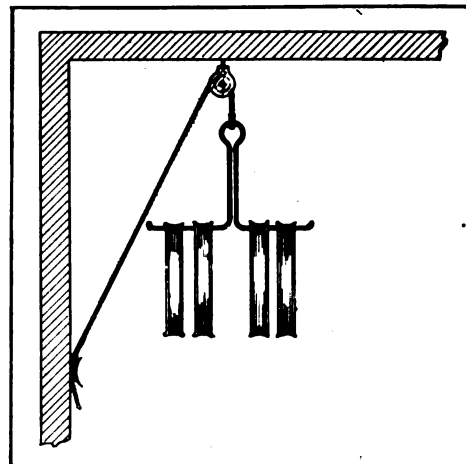
The pipe should be of a size that will fit the thread of the inside of the shell. A short length of the pipe is screwed into the shell and the tee placed on the other end. The other two pieces of pipe are threaded on one end and screwed into the tee to form a handle.

If two of these tools are made, they may be screwed into plug holes at opposite ends of the head, facilitating its removal.—R. A. I., Iowa.

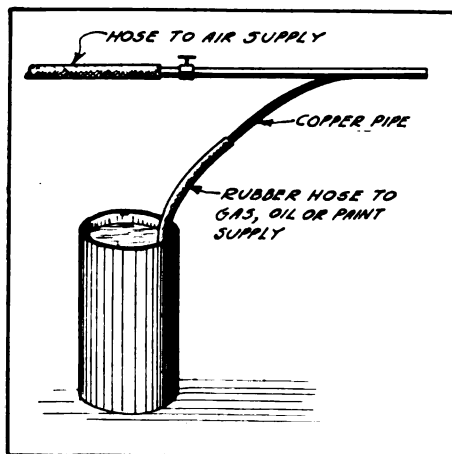
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Storing Spare Wheels and Rims.

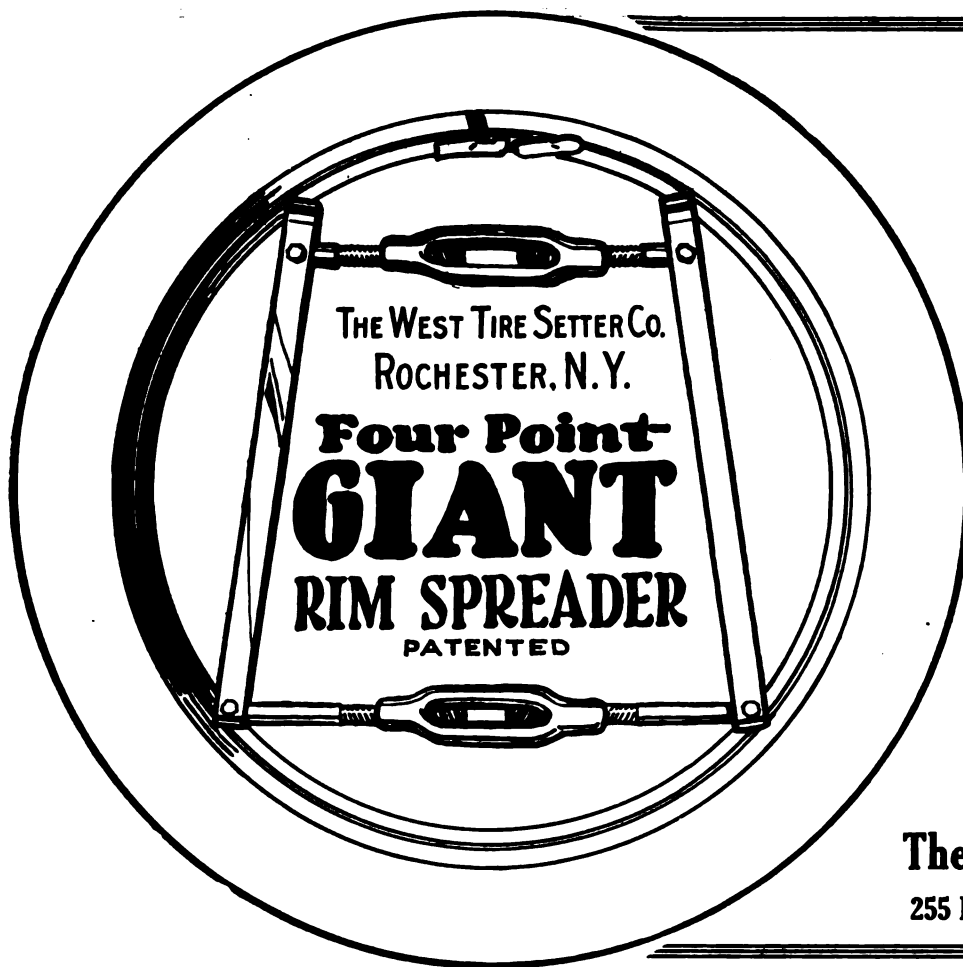
Space in the stockroom is often at a premium. By having a few hooks made, and then fastening an awning pulley in the ceiling and fitting with a strong sash cord, the spare wheels or rims may be drawn up out of the way.—R. W. T., Mo.



Saves Space in the Stockroom.



Effective Method for Priming Engine.



Those Obstinate Rims—

put them back—easily—and quickly—with the GIANT RIM SPREADER. No rim—even though it is badly out of shape—can resist the four bearing points of the GIANT.

The GIANT does everything an expensive floor stand machine will do—and more. And the price is particularly noteworthy—\$6.00 F. O. B. Rochester.

You need the GIANT. Let it make your work easier—your work quicker—and every rim-spreading job "perfect."

The West Tire Setter Co.
255 Mill St. Rochester, N. Y.

**If
You Just Knew What
The Flexlume Trade-Mark
Stands For—**

If you had been building electric signs for 15 years, putting your heart behind an idea you originated—the raised, white glass letter. If you had built up the largest corporation in the world making electric signs exclusively. If your business represented many thousands of dollars of invested capital, an organization extended from coast to coast and over seas. If your designers were the acknowledged leaders in their art, your engineers the best—

If you realized these things as we do, you would understand what we mean when we say there is more to Flexlume Electric Signs than glass and metal.

Let us send you a sketch showing a genuine Flexlume for your business.

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25 Kail St. BUFFALO, N. Y.

Readers' Questions and Answers

Field Resistance of 1916 Maxwell.

Can the field resistance of the 1916 Maxwell lighting system burn out, and where can I get a new one?—F. H., Wis.

Yes, the field resistance of the 1916 Maxwell can burn out. A new unit may be obtained from the Briggs & Stratton Co., Milwaukee, Wis., or from any electrical supply house handling B & S products.

* * *

Effect of Heating on Steel.

Does heating the front axle to a dull red heat, when straightening, injure the steel or offset the advantages of heat treating?—N. O. P., N. Dak.

Heating to a dull red should not affect the steel permanently. However, care should be used when heating, as it is easy to heat some parts of an axle to an excessive temperature. It should be heated slowly and no hotter than is necessary.

* * *

Forged Steel Automobile Cylinders.

During the war, much was published about the development of forged steel cylinders for airplane use. Several of the engines using this type of cylinder proved very successful and many people expected to see this type of cylinder become common automobile practice. Why has no automobile manufacturer used such a cylinder?—E. V. W., Minn.

Airplane engines should be very light in proportion to the power they develop and are usually rather expensive. The steel cylinder is strong and, when forged, contains no blow-holes so that it can be made very thin and consequently very light.

However, this type of cylinder is rather expensive. The cast-iron cylinder is easy to cast and offers a very good wearing surface. The price and wearing qualities seem to be more important in automobiles than a small difference in weight.

* * *

Ford Magneto Voltage.

How many volts must a Ford magneto generate to make the engine start easily?—R. N., Wis.

The voltage of a Ford magneto should reach 6 at a little less than four miles an hour. At 10 miles, it should be about 12, and should reach 20 volts at about 20 miles an hour.

An alternating current voltmeter is needed to measure the magneto voltage.

* * *

Re-Winding Motorcycle Armature.

Could you give me directions for re-winding the armature of a 250 Remy generator from a Harley-Davidson motorcycle? What size wire, etc.?—J. P., Mich.

A diagram of the Remy generator used

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your business, the more you will know—and the more you know, the more money you will make.

Whether you are a dealer, a salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

on the Harley-Davidson motorcycle is given on this page. The armature has 13 slots and 13 segments. The coil pitch is 1 and 6. There is one coil per slot, having 26 turns.

The size of wire is No. 21. It is insulated with single copper over enamel. The commutator connections have 1 and 2 left. The top lead is at 4 right of the first slot. The bottom lead is at 5 right of the first

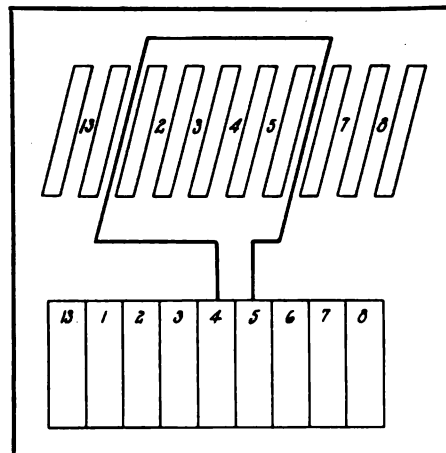


Diagram of Remy Generator for Motorcycle.

slot. This armature is used in a two-pole and 6-volt generator. The winding is a typical lap winding.

* * *

Maxwell Gear Ratio.

Will you please tell me through the AMERICAN GARAGE & AUTO DEALER whether a lower ratio gear can be used in a 1916 Maxwell?—W. V., Wis.

The standard gear ratio of the 1916 Maxwell is 3.58 to 1. A ratio of 3.75 or 4.00 to 1 will give good satisfaction in this car.

* * *

Ford Piston Clearance.

If a Ford piston has a clearance of about 1/40-inch, if pushed to one side will it cause a knock in the engine?—H. R., N. Y.

A clearance of 1/40-inch or 0.025-inch for the Ford piston is too great, and will allow a piston slap which is a form of "knock."

* * *

Testing Set to Detect Short Circuits.

Please send us instructions as to how to make a testing set for detecting short circuits in generator field windings and armature windings.—B. S. Co., Mo.

In order to locate short circuits in generator field windings and armature windings, it is necessary to take a reading of each field separately.

To do this, place an ammeter in series with the battery, connecting one lead from the battery to one lead on the field, and the other lead of the battery to the other lead of the field.

Suppose this field draws a current of ten amperes. Now test each field in the same manner. If they all draw the same amount, it indicates that they are not short-circuited. If, on the other hand, one coil draws more current, it indicates that the coil has a short circuit, as there is less resistance in it than in the others.

To test the field coil for a ground, it is only necessary to connect one lead from a 6-volt storage battery to the frame of the generator and the other lead to the field coil. Be sure that all intentional grounds are removed before making this test. If the current flows, it indicates that there is a ground in the field coil.

Grounds in the armature windings may be located in the same way. After determining that the ground is present, you can generally locate it by making connections between the battery and the coil to be tested with a heavy starting cable. This will generally allow sufficient current to pass to produce smoke at the point where the ground is present.

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Spiral Expansion Aligning Reamers

(Patent Pending)

*for Piston Pin
Bushings On All
Cars and Trucks*

THE new features have created an instant demand for this mechanically perfect boring and reaming tool.

A slight turn of screw in end affords even, accurate expansion. Easy to micrometer.

The Self Cutting Pilot does rough cutting leaving Reamer proper to do finish reaming only. Holes are reamed in perfect alignment as front pilot guides for beginning and rear pilot for ending of reaming.

Left hand spiral flutes cut easily and smoothly with a shearing motion leaving a full bearing surface with mirror-like finish.

THEY WILL NOT CHATTER

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or Write Us for Literature*

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ALBANY, N. Y.



HAVE THEM REBABBITTED

Dealers, garages and repair shops familiar with our rebabbitting service have stopped throwing away connecting rods and bronze back bearings when the babbitt lining gives out. They have collected all such parts around their repair shops—had them rebabbitted and are now making an additional profit on replacements.

CONNECTING RODS



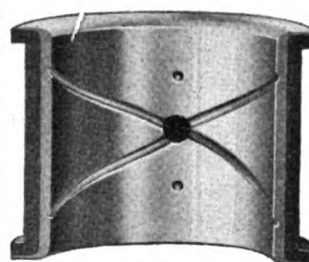
We specialize on rods using a bearing cast in the rod and recommend the same process on rods which use insert bearings if you have trouble with inserts working loose and beating out.

We tin in a bearing of S. A. E. specification babbitt, broached to crankshaft size, duplicate original oil holes and grooves.

Also furnish new bolts, nuts, laminated shims and bronze bushings in many popular car rods using a poured-in-rod bearing.

CRANKSHAFT BEARINGS

Bronze back crankshaft and connecting rod bearings can also be rebabbitted. It is often difficult to find new bearings, especially for "orphan" cars. You save time and money sending yours to us to be refilled. We machine bronze back bearings to special sizes for re-ground crankshafts when caliber dimensions of throws and mains are furnished.



Send Parts to Factory Nearest You for Quickest Service.

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3 Main Street, Waterloo, Iowa

WATKINS MFG. COMPANY

203 Wyoming Street

Syracuse, New York

SERVICE ON ANY CAR TRUCK TRACTOR

Wiring Diagram 1921 Ford.

Will you please publish in the *AMERICAN GARAGE & AUTO DEALER* a wiring diagram of the 1921 Ford?—F. H., Wis.

A diagram showing the wiring for the 1921 Ford appears on this page.

* * *

Generator Trouble.

I am a mechanic in a garage and am deeply interested in things electrical, and I have a case on which I should like some enlightenment.

A friend of mine owns an Oakland six, 1916 model 32. This car has a Remy system generator, model 166. This generator is in one unit with the interrupter, and originally had a two-pole, two-wire ignition.

However, some time ago, the coil went bad and, being unable to get the same type coil, I installed a coil not having the same connections.

Instead of making a two-wire ignition, I removed one wire from the switch and left the other end hanging free. I grounded the coil and one side of the interrupter, thus making a one-wire system of the ignition. This works all right and has never given any trouble. But now the generator has quit and gives every indication of a burned-out armature. This is the second time the generator has gone wrong since I put on this coil.

I, personally, have never had anything to do with this part of the system, as each time the trouble occurred in another town. Now the mechanic who had charge of the generator repair says that it was caused by using this coil, and by making a one-wire system of the ignition.

I do not think so, because the generator charging system and the ignition system are separate and independent, and I cannot see how, by using the single-wire ignition, it would cause the generator armature to burn up, when I changed nothing in connection with that part of the system.

I rather think the trouble lies, either in the relay, which is a model 60 or in some part of the wiring between the relay and the battery.—C. N., Ind.

If the only change made in the ignition wiring was to ground one side of the coil and one side of the interrupter, it will have no effect on the generator and the source of trouble is evidently outside the ignition system.

The first thing to look for would be an open circuit or point of high resistance between the battery and the generator. This would mean to examine the terminal connections and wires (1) from battery to starting switch, (2) starting switch to ammeter, (3) ammeter to fuse block connection, and (4) fuse block connection to terminal on relay regulator.

Then test for these troubles between this last terminal on the relay regulator and the cut-out contacts, thus testing the cut-out series winding. Then see that the cut-out contacts are clean; that they meet squarely and that the cut-out closes every time at a car speed not over 12 M.P.H. or 700 R.P.M. of the generator.

Next, see that the small 15-ampere fuse on the relay regulator is of low resistance fuse wire, and that it is securely fastened and clean at both terminals. Finally, test the line from this fuse to the middle brush

of the generator for intermittent open circuits or high resistance.

This procedure has followed the charging circuit from the battery to the generator brush. Now, see that the battery is well grounded and that the ground connection does not shake loose under any condition.

The trouble is more likely to be in the generator fields than in the armature windings, although you seem to think that the armature goes wrong. If this is the case, we should like to have you write us further, advising whether there are any spots on the commutator that appear burned or that appear excessively bright and coppery. Also whether the commutator mica is properly undercut. Let us know, too, whether the brushes are of sufficient length and whether the spring tension is great enough to keep them on the commutator at all times.

You might try moving the brushes in their holders, with the generator running, and notice whether this causes any great drop in the charge rate. We should also know at what speed the charge commences, as shown by the ammeter, and the charge rate in amperes at two or three different speeds above 15 M.P.H.

Finally, please learn definitely and inform us whether the trouble was found in the armature or, in the field coils. This will enable us to make a more intelligent diagnosis of the cause for the trouble.

* * *

Stove in Garage.

Being a subscriber and constant reader of your paper, would be pleased to receive some information in regard to the matter of stoves in garages.

We have had a stove in for a number of years, and during the summer we were ordered to remove it. Is there any law in regard to this?—P. B., Ill.

So far as we know, there is no state law against stoves in garages, as that is a matter of regulation coming under local au-

thority, and which is usually vested in the fire department.

Of course, if the building is insured, the rules of the fire underwriters would oppose any stove in a garage where gasoline cars are kept or where gasoline is stored because of the fire risk.

Should the building be covered by insurance under those conditions, the rate for the insurance is undoubtedly considerably higher than if the gasoline were not in the garage.

From the reading of your letter, we assume that it is the local authorities who have ordered the removal of the stove in your garage. Undoubtedly, they would not have any objection to the stove being placed in a separate room where there would be no danger of gasoline being ignited.

If you have not consulted your local authorities who are charged with the enforcement of fire regulations, we would suggest that you do so.

* * *

Engine Knocks.

Why does one get a spark knock at a certain engine speed and position of the spark lever when the engine is pulling but, with the same speed and position of the spark lever, the engine will not knock when idling or pulling a smaller load?—L. J. W., Mo.

In the first instance, the throttle is open or nearly so and the engine has a full charge in the cylinders for each explosion. Consequently, the compression will be high and the gases heated by compression so that they will burn at a high rate of speed. If they burn enough to set up a high pressure before the engine is over dead center, a knock will be caused.

In the next case, the cylinder contains only a partial charge, as the throttle is only partially opened, so that the compression is low and the burning very slow and the force of such an explosion is rather weak.

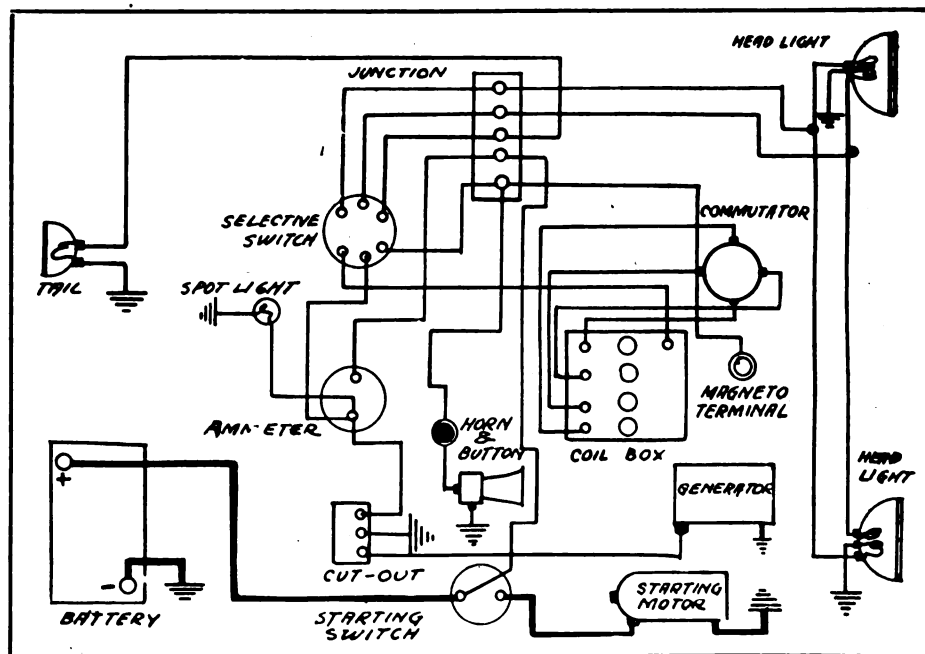


Diagram Showing the Wiring for the 1921 Ford Car.

What Are You In Business for--

Profiting most by serving best explains the success of the Dealer in CON-O-CO PROCESS Motor Oils.

Older than business itself is the truth that a good product endures and its patrons multiply. QUALITY in oils must begin at the beginning—it must be in the crude. CON-O-CO PROCESS Motor Oils are high grade PURE PENNSYLVANIA lubricants.

CON-O-CO PROCESS Motor Oils are your opportunity. They are not only vastly different from but far superior to ordinary motor oils.

CON-O-CO PROCESS is not a light oil compounded with a heavy cylinder stock, as are general run oils offered on the market. They are wholly distilled—PURE PENNSYLVANIA—therefore free of any gummy residue to cause

hard carbon deposits, leaky valves, dirty spark plugs, and other troubles.

CON-O-CO PROCESS is made in seven refined types with the skill of expert analytical chemists in oils.

WHY HANDLE "just oils" WHEN YOU CAN HAVE THE BUSINESS CERTAINTY OF CON-O-CO PROCESS MOTOR OILS.

If your name is not on our books, permit us to show you. Let us quote you some interesting dealers' prices.

CONSUMERS' GUARANTEE—Buy it, try it, return it, without charge, if you are not satisfied. You are the sole judge. You will understand that such a broad guarantee is only possible because of the exceptional quality of CON-O-CO Products.

Write or Wire

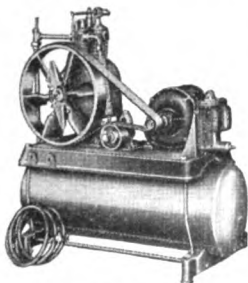
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Chicago, Ill.

Consumers Oil Company
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Refineries
Pittsburgh, Pa.
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Belted only—five sizes, $\frac{1}{4}$ to 3 h. p. complete, less driving power.



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Sizes $\frac{1}{4}$ to 2 h. p. Furnished with automatic starter. A. C. or D. C. motor.

"An Original Design"

YOU can purchase a Curtis Outfit with all the confidence that goes with a well-known, thoroughly established and reliable product. Sixty-nine years of experience, over twenty-six of which have been devoted to the manufacture of air compressors, have enabled Curtis engineers to develop an entirely original design based on sound engineering principles.

First and Only Two-Stage Air Compressor With a Copper Intercooler

Curtis Single-Stage Compressors have controlled splash oiling system—no excess oil to rot tubes. Big saving in oil. Fan flywheel aids in keeping cylinder cool; increases capacity. Hand unloader prevents blowing fuses and jumping belt, and many other exclusive features. Several styles and sizes.

Curtis Two-Stage Compressors have all features of the single stage. Exclusive aeroplane-type copper intercooler assures fullest advantage of two-stage compression. They are perfectly balanced so that the crankshaft bears a uniform load—this assures less vibration and wear. Several styles and capacities. For full information use coupon, or a postal will do.

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folder and full particulars on
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CURTIS *Single and Two Stage*
Air Compressors

Bulb Voltages.

Please inform me whether or not a 9-volt bulb will stand more than an 18-24 or 12-16-volt bulb?—F. H., Wis.

A 9-volt bulb will not stand as great a voltage as either a 12-15 or an 18 to 24-volt bulb, since the resistance of the 9-volt bulb is less and a higher voltage than nine or ten will send sufficient amperage or current through the filament to burn it out.

The amperage forced through any bulb is proportional to the voltage used.

* * *

Ford Generator Fouls Commutator.

We have a Ford generator that continually dirties the commutator. What causes this?—B. S. Co., Mo.

This condition is undoubtedly caused from improper setting of the brushes, high mica, or brushes that stick in the brush holders.

To set the brushes properly, remove the generator and connect it to a 6-volt battery. The brushes should be set in such a position that it will cause the armature to rotate slowly in the direction that it is driven when on a car.

Before replacing, be sure that the commutator is round and smooth, and also that the brushes are free in the brush holders.

* * *

Weakened Ford Magneto Magnets.

Can the coil assembly of the Ford magneto ever get weak?—F. H., Wis.

The coil assembly does not get weak, but the magnets of the Ford magneto can and do get weak and need replacement or re-magnetizing.

Too much clearance between the magnet poles and the core pieces of the coils will cause low voltage. This clearance should not be much in excess of 1/32-inch.

* * *

Rectifier or Resistances?

I can buy direct and alternating current at the same price, for battery charging. Which will be the cheaper to install and to maintain—a rectifier or resistances?—L. S. Ill.

Suitable resistances can be bought at a somewhat lower price than a good rectifier or converter. As there is always more or less loss when using a rectifier or converter, the direct current will prove the cheaper.

Best results are obtained when the battery voltage is near the line voltage so that but little resistance is needed and there would be but little resistance loss.

* * *

Increasing Generator Output.

Will you please tell me if there is any method of increasing the output of the generator on a 1920 model Overland 4?

If so, can it be done without removing the generator from the car?—R. C. S., Tenn.

The maximum output of the Auto-Lite generator on this car should be 16 to 17 amperes, cold. Higher rates should not be

attempted because of heating and conductor capacity.

The charge rate is increased by moving the third brush with the direction of armature rotation. This brush is carried by a

Now It's Your Turn.

In answering these queries concerning the difficulties arising in garage work, we have given the generally approved methods.

But we realize that many of our readers will have a different way of "doing the trick," and can offer interesting and helpful suggestions from a different angle. So we would like to have you tell us whenever you have a different method for handling these various questions.

Let's make this a Round Table for the exchange of ideas and thus be mutually helpful!

holder and locked with a stud and nut in a slot of the brush-holder plate.

Loosening the stud nut will allow moving the brush either direction and, with it placed at the limit of travel in the direction of rotation, maximum output will be secured provided other conditions in the generator are right.

* * *

Ejector Type Manifold.

I wish you would please tell me how the ejector type of exhaust manifold is constructed.

The type which I have in mind is the one which makes use of the exhaust gas rushing through the manifold to create a suction to scavenge the dead gases from the other cylinders on their exhaust stroke. If you can tell me where I can get a sketch of it, I shall be very much obliged to you.

Please tell me, also, if the carbureter is considered as a part of the intake manifold of an automobile engine.—H. W., W. Va.

The illustration shows the construction of a two-part manifold, built on the ejector principle, in which the three forward cylinders of a 6-cylinder engine exhaust into one part of the manifold, while the three rear cylinders exhaust into the second part.

In any 6-cylinder firing order, after one of the three forward cylinders exhausts, it is followed by a cylinder of the rear three, then another in the forward three and so on.

The two-part manifold thus gives time for one exhaust to clear itself into the muffler pipe before the next one is discharged into the manifold. The order in which the cylinders fire, with the most

commonly-used firing order, is indicated by the numbers on the illustration, and this will help to make clear how alternate exhausts pass into first one part of the manifold and then to the other.

The stream of gases coming from either part of the manifold into the common connection leading to the muffler is considered to have a scavenging or ejector effect on the comparatively slow-moving gases remaining in the other part from the preceding exhaust.

Mufflers have been made on the ejector principle that operate somewhat on the principle of the steam boiler injector—that is, the high speed of the gases through a tapered orifice tends to eject the remaining dead gas from the exhaust piping and muffler through the slight vacuum created in one of the chambers. It may be this type of muffler that you have in mind.

In regard to your second question, the carbureter, as generally spoken of, is not considered as a part of the intake manifold. The manifold, or the intake connection in some cases, starts from the carbureter and ends at the cylinder block. The intake passage then goes from the entrance to the cylinder block to the intake valves. Theoretically, the air passage through the carbureter might be considered a part of the intake manifold, but this is not done in everyday work.

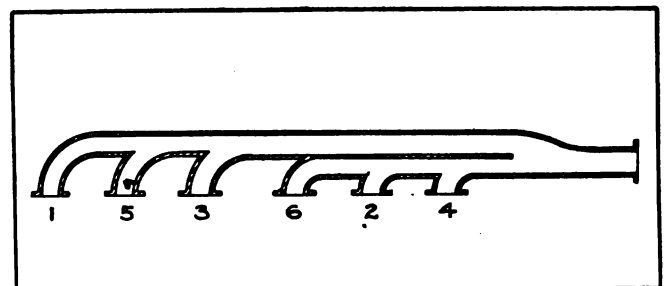
* * *

Care of Silent Chains.

Please publish in your good magazine the best method for cleaning silent chains.—M. R. S., Ohio.

A good way to clean the silent chains is to prepare a kerosene bath in which the chain should be thoroughly soaked. Remove all dirt and grit with a good stiff brush.

After drying, the chain should be washed in hot water to which a small amount of washing soda has been added. Then prepare a bath of fairly heavy lubricating oil. Warm the oil and cover the chain with it, allowing the chain to remain



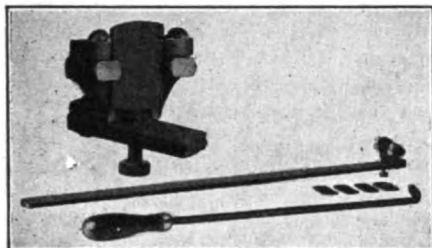
Shows Construction of Two-Part Manifold, Built on Ejector Principle.

in this bath until you can feel assured that the oil has reached all parts of the bearing surface.

The warming of the oil makes it thinner, so that the lubrication process is more thorough.

BIG PROFITS IN REPAIRING SCORED CYLINDERS

No secret or mystery with the TORIT process



TORIT SCORED CYLINDER TOOLS

(Adjustable blade holder magnified)

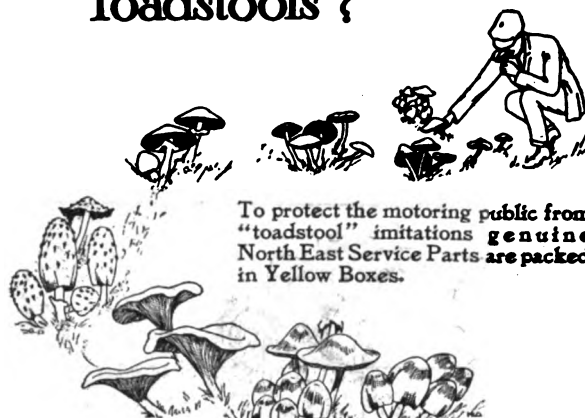
TORIT tools refinish the cylinder to the same bore and surface. No new pistons, no regrinding. Easy work, big pay. Get your outfit now.

Price of tools, as shown, with instructions.....\$10.00
Filling-in metal, per pound..... 3.50

ST. PAUL WELDING & MFG. CO. 165 W. 3rd St., St. Paul, Minn.

Mrs. TORIT torches, generators, preheaters, etc.
Distributors REGO oxy-acetylene equipment.

Mushrooms or Toadstools?



To protect the motoring public from "toadstool" imitations genuine North East Service Parts are packed in Yellow Boxes.

Genuine North East Service Parts are distributed to the trade by

NORTH EAST SERVICE INC.

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Official Service for
North East Electric Co.
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Manufacturers of
Starters Generators Ignition Horns
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Immediately
Indicates
the
Magneto's
Condition

It's
a

Sterling

Magneto-Meter

This meter is a complete and accurate device made with special regard for convenience and speed in testing Ford Magneto. Contains a standard Sterling alternating current voltmeter and is useful for testing any low tension magneto. Equipped with special one-hand contact handle and cord. Results just as accurate as those obtained with equipment costing several times as much. Price \$8.50 net.

OTHER STERLING PRODUCTS: Dash Ammeters, Polarity and Pocket Meters, High-Rate Cell Test rs, Portable Rectifiers and Spring Oilers. Write for Bulletins.

THE STERLING MFG. CO.

2849 Prospect Ave. Cleveland
Over 2 1/4 million Sterling electrical devices in use today.

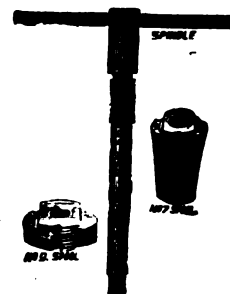
"It Always Does"

No matter in how difficult a place a bushing may be or how tight it is

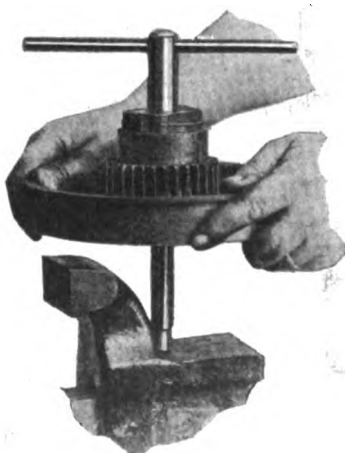
The Holly Bushing Extractor

always gets it out! Extracts sizes ranging from 3/8" to 2 5/16".

Used and recommended by leading motor manufacturers. Tools to be had singly or in sets.



No. 79. Extracts bushings—1 7/16 to 2 5/16 inclusive.



No. 79 extracting Ford Transmission Reverse Drum Bushing.

Standard set
(Nos. 0, 1, 2, 3,
4 and 34B tools)..... \$18.40

Combination set (No. 579 tool extracts bushings from 1 1/16 to 2 5/16" inclusive)..... \$10.00

Special Ford Set
(Nos. 1, 2, 3, 4 and 79 tools, extracts all bushings in Ford cars and trucks)..... \$20.00

If your jobber cannot supply you, order direct from

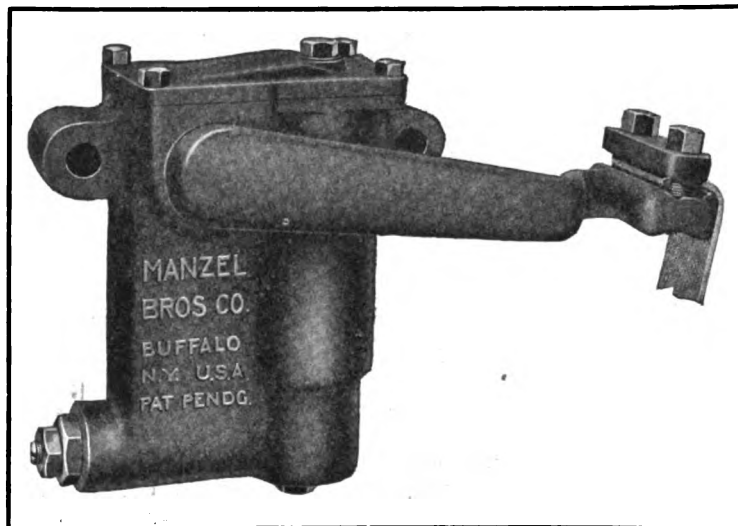
The Rosier-Howard
Corporation
287 National
Hutchinson,
Kansas

Accessories—Dealers' Key to Profits

Hydraulic Shock Absorber, A New "Manzel" Product, Is Announced

A shock absorber embodying several new features is announced by Manzel Bros. Co., of Buffalo, N. Y.

This new device is of the hydraulic type

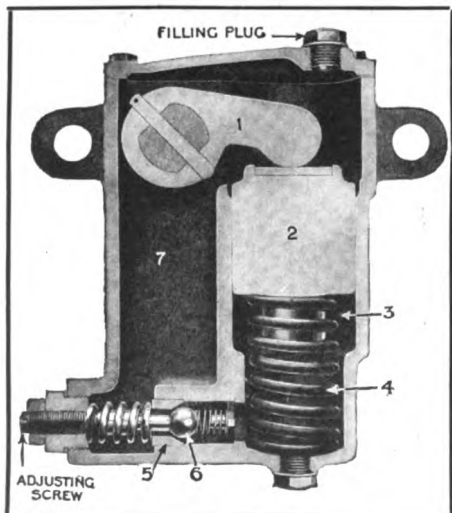


New Manzel Shock Absorber of Hydraulic Type.

and can be furnished for practically all models of cars. It is attached to the frame and is connected to the axle by means of a strong, webbed strap and clamp.

It does not interfere in any way with the normal compression of the springs, but co-operates with them to check the rebound, prevent spring breakage and side sway and cause the car to ride smoothly on all roads.

An exclusive feature of the "Manzel" is its automatic control, by means of double-acting valves which open and close according to the severity of the shock and control the passage of the oil—which is used as the co-operating medium—between the absorber's inner and outer chambers.



Oil Is Drawn Into Inner Chamber at "3."

When the automobile spring compresses, the piston moves upward and the oil is drawn into the inner chamber, shown at "3" in one of the illustrations, directly below the piston. When the spring attempts to expand or, in other words, to rebound,

the arm is pulled down by the webbed strap and acts through the cam, at 1, on the piston 2, which in turn exerts a pressure on the oil in the inner chamber. The oil is forced slowly through the valve opening at 6, allowing the spring to expand so gradually and easily that the shock's force is broken and is

scarcely felt by the occupants of the car.

In the case of an extra severe bump, the initial shock opens the relief valve 5, increasing the opening around valve 6 long enough to allow sufficient oil to pass through to relieve the strain, when it again closes to its original position and the oil is forced through the opening exactly the same as occurs when less severe shocks are encountered.

The mechanism is quick acting, responding instantaneously to every shock.

The valve action may be regulated for any weight of car by increasing or decreasing the size of the valve opening at 6 with the adjusting screw.

All working parts are immersed in oil, making the mechanism self-lubricating, free from wear and noiseless in action.

The installation is simple and any mechanic can install a set in from four to five hours of time.

Further details as to prices, etc., may be had upon request from the manufacturer at address given.

A Fourchime Whistle Pleases Motorist, Traffic Man and Public.

While there is nothing in the note of a Fourchime automobile whistle to offend or startle, it does feature a tone that is powerful and far-reaching.

It is a warning blended with four tones as a chime, and it operates while the motor is idling as well as when it is speeding. The upright position of the Fourchime

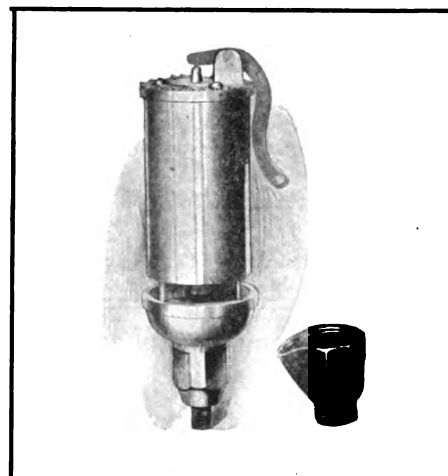
whistle on the car assures less jar and vibration and, therefore, means less wear and the retention of the tone quality.

The Fourchime is equipped with a special tempered spring that is guaranteed to maintain its tension. Being encased on top, it cannot rust or heat.

Another feature to be noted is the quality of material and workmanship. The base casting is of brass and coupling steel, the tone chamber is of bright nickel, and the whistles are thoroughly finished.

Very little power is required for the operation of Fourchime whistles, and there is no adjustment or assembly of parts as they are shipped compact and ready for installation.

These whistles are suitable for use on



Fourchime Whistle Gives Power and Far-Reaching Tone.

motor boat engines as well as for automobiles.

Write the Fourchime Auto Whistle Co., 23 Marshall St., Newark, N. J., for complete information.

N. E. Oliver Now Vice-President of Quaker City Rubber Co.

C. A. Daniels, president of the Quaker City Rubber Co., one of the oldest and best rubber manufacturers, has announced the appointment of J. M. Dixon and N. E. Oliver as directors of the organization. Mr. Dixon is president of the Tobacco Products Corp. and director of many other large corporations of the country.

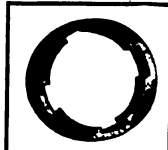
Mr. Oliver was also elected vice-president, the appointment becoming effective immediately. This is an important move in the rubber industry as Mr. Oliver is a pioneer in the business. He has a fine record of achievement in practically every phase of rubber manufacturing and distribution. He is a pioneer, having been associated as a director of the Diamond Rubber Co. and later became general man-



A BETTER TIMER TO TIME 'ER BETTER

The M & R was designed for all types Fords and tractors. On solid ring fibre, two of the wearing surfaces are with the grain and two against grain—one of the main "reasons" for such a quality timer. It's backed by our guarantee. Your customers will be enthusiastic about the M & R. Write for details—now.

McCulloch Mfg. Co.
216 High Street Boston, Mass.



Raceway—made in four sections—all cut against grain.



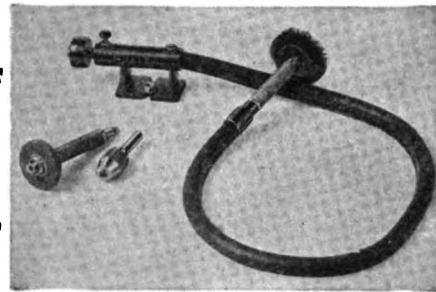
Oiler—spring-top type, self-closing, of sensible size.



Retaining Ring binds raceway, keeping it absolutely rigid.



Handle—made in one piece and securely attached to shell.



There's No Argument About The Muller Flexible Shaft Buffer Grinder Outfit.

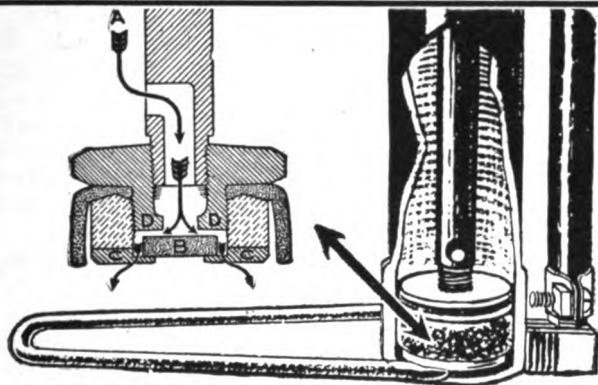
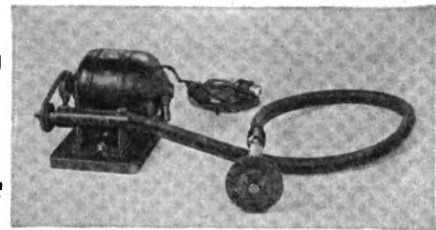
Garagemen universally agree that it's "just right" for buffing any size tire—and for grinding and drilling. Saves 75% on horsepower over old style buffer stand. Extra heavy in design. Bench outfit readily attached to regular motive equipment, or motor furnished. The Muller, in short, assures stronger repairs and greatly increased profits with less labor.

Saves 50% of the Workman's Pay.

Send for data

MULLER FLEXIBLE SHAFT CO.

Third & Olive Sts. STILLWATER, MINN.



It's All in the Valve

Easy action is what your customer wants when he buys a tire pump. Looks is not worth a whoop if it won't pump easily. That is the chief fame of the Rose. The patented valve practically eliminates friction and suction loads. It pumps with a smooth, free stroke. Ask 'em to buy and tell 'em about the valve.

FRANK ROSE MFG. CO., HASTINGS, NEBR.

ROSE TIRE PUMP

Battery Repair Men! Automotive Electrical Stations!

Suppose a specialist were to enter your shop and help you select instantly the right battery, magneto or ignition part necessary to handle every job;

—and he also showed you the most economical way to buy Battery and Electrical testing and repair equipment: the kind that insures quick and skillful results;

—and his wealth of information included every tool and Replacement part that finds its way into a modern battery or electrical service station like yours;

—would you like to have his services—FREE?

Our new 138 page catalog is just such an expert—a helper that points a finger to the exact solution of every equipment or parts problem.

A copy will be forwarded on request, FREE—WRITE NOW!

W. F. PRICE BATTERY SUPPLY CO., Inc.
3300 N. Broad Street. Philadelphia, Penna.

ager of the B. F. Goodrich Rubber Co., of New York, where he had charge of practically all of the Eastern states.

During the present arrangement as vice-president, Mr. Oliver contemplates a substantial financial interest in the Quaker City Rubber Co. It was organized by its present president, C. A. Daniels, in 1885, with a nominal capital which, through accumulated earnings and superior type of products, has grown into an organization worth many millions.

Many friends of the rubber and automotive industries are sure that the vision and creative ability which Mr. Oliver will bring to the Quaker City Rubber Co. will add tremendously to the present rapidly growing organization.

Extensive plans for developing new outlets for Quaker City Rubber Co. products and largely increasing the volume of operation of the company are contemplated.

Gibson Gauge Assures Correct Oil Level for Best Results.

A metal float oil gage, with its indicator on the dash, is claimed by its makers to fully meet the necessities of Ford owners in permitting them to carry their oil level just where they are told in their Ford manual that the best results will be obtained, namely, "midway between the two cocks."

It gives the information in the desired manner because its red ball indicator—attractively mounted on the dash, to the right of the coil box—is an ever-present reminder, without conscious effort on the

part of the driver, that he should or should not replenish his crankcase oil.

The main parts are of aluminum. For instance, the substantial float chamber is rigidly attached to the drain hole of the crankcase, in a protected and self-supported position, by a plug which is substituted for the regular plug. Thus the oil level in the chamber follows that of the crankcase itself under all conditions, even when the car is tilted sideways, due to the crowning of the road.

As the oil level falls or rises, the metal float follows and by means of the high-grade flexible dental shaft, causes the indicator ball upon the dash to show the oil level in the crankcase.

The regular oil-test cocks of the Ford are not interfered with, and it is unnecessary to set the car level, raise the hood or perform any other act except cast an automatic glance at the gage in order to be assured that the life blood of the engine is present in sufficient but not too great quantity.

The Gibson Gauge Co., of Moline, Ill., will furnish full particulars on request.

Demand of Ford Owners and Dealers for High-Grade Visor Met.

The Ford owner may speak lightly of his "Henry" or his "flivver" or his "Lizzie," but at heart he is just as proud of his car as though it had 12 cylinders and a \$5,000 price tag.

When it comes to the matter of accessories, he wants the best, and is willing to pay the price. In fact, he's a better accessory buyer than the average big car owner, because he has been educated to buy many of the comforts and luxuries which come as standard equipment with high-priced cars.

The Ford owner's desire for good equipment, and his willingness to pay a fair price for it, was demonstrated recently in the experience of Thoma & Son, Inc., of Fairfield, Iowa, manufacturers of the Sunbeam visor.

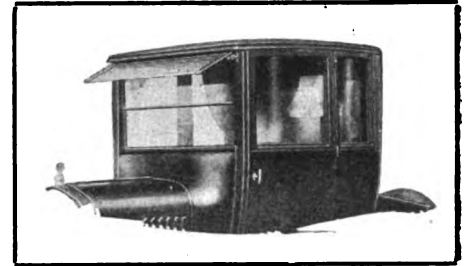
This visor, which is of high quality, was not made last year for open Fords, in the belief that in quality and price it was out of the buying range of the mass of Ford owners.

As the Sunbeam visor secured wide publicity and distribution, however, hundreds of letters began to come in from Ford owners—and a little later from Ford dealers—asking where the visor could be obtained for Ford cars.

The company had to answer a great number of such letters before it awoke to the fact that it was in reality passing up a tremendous market for its product, but finally the demand became so insistent and the interest so marked that the company's engineers set themselves to the task of designing and manufacturing a high-grade, colored ribbed-glass visor for Fords.

The result was the "Sunbeam Junior," and so ripe was the market that the first mail announcement to dealers brought a return—not inquiries, but orders—that absolutely assured the future of a high-grade visor for Ford cars, says the manufacturer.

The Ford owner is the best buyer of



Sunbeam Visor for Ford Cars.

good accessories in the whole car owner fraternity. He owns a Ford, oftentimes not because it is the best he can afford but because he feels it is the best value for the money, or because it serves his purpose better than a high-priced car. He's proud of his car and he likes to dress it up—and where an accessory makes for comfort or safety in driving, he wants the best the market affords.

Further particulars concerning the Sunbeam visor may be had upon request directed to the manufacturer at the address given.

Dyer Piston Directory for 1923 Now Ready for Distribution.

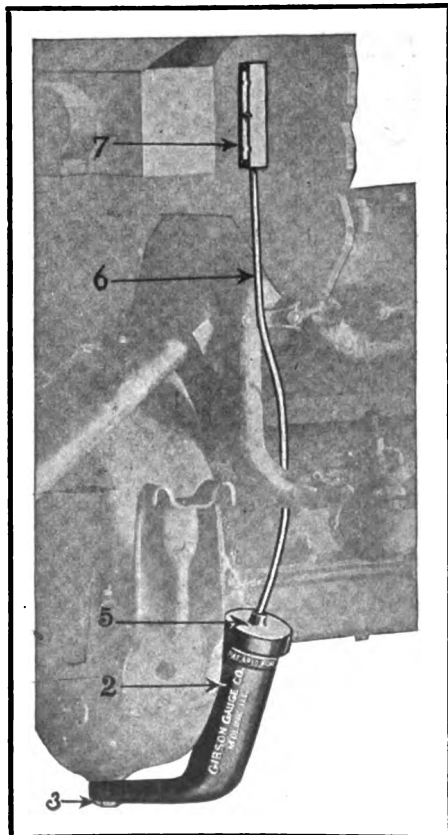
Dyer products are so well known throughout the automobile trade of the world, together with their enviable reputation for high quality and exact workmanship, that the announcement of the issuance of the new 1923 Dyer piston directory is one of importance to garagemen and dealers everywhere.

For this is not merely a catalog of Dyer products but in it the Dyer Co. has endeavored to give to the automotive and cylinder regrinding trades an even more complete and extensive handbook on replacement pistons and piston assembly parts than in the previous issues.

It contains complete specifications for pistons and pins for passenger cars and trucks, together with the prices of pistons, pins and bushings, specifications for stationary motors arranged by diameters, specifications for marine motors arranged by diameters, and specifications for tractors. It also presents a table of exact diameters of Dyer finished pistons, of stock sizes and of decimal equivalents.

In addition a number of the Dyer products are described and illustrated. New models and items are constantly being added to an already very complete line.

The data contained in this directory has been compiled from knowledge acquired during nine years of experience as one of



Gibson Gauge Has Indicator on Dash.

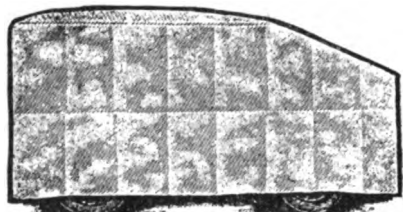
Kennedy Auto Covers

Keep the Cars
Shining and
"Tickle" the Trade

These auto storage covers—of strong, heavy paper, slip over the cars and keep them clean for days, for weeks, for months. In five standard sizes—fit any car. And you can sell them to customers who keep their cars in their own garages. Good profits all the way 'round. Send for literature—it's worth while.

**THE KENNEDY CAR LINER
AND BAG COMPANY**

Shelbyville, Ind.
Canadian Factory
Woodstock, Ont.



The Best Way We Know How To Tell And Prove It To You.

August 28th, 1922.

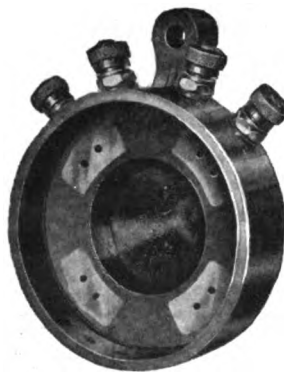
Gentlemen:—

I have used your BLU-BLAZE TIMER on my Ford Coupe this season and so far have driven nearly ten thousand miles without one bit of Timer trouble. While last year I drove fifteen thousand miles and used six Timers of other makes. I am satisfied that your Timer is a wonderful one, and am desirous of handling same exclusively. I am on the road and have been for twenty years. I would like to get a protected territory on your Timer, Minnesota, Wisconsin and Michigan preferred, but will take anything you will give me. If you cannot or do not do this, please give me your prices in quantity lots, say in one dozen lots, fifty lots, one hundred lots and also in five hundred lots.

Yours truly,

O. J. La B.
Iron River, Michigan.

Below — The simple rotor, showing copper-carbon brush.



The Condensite shell, showing polished raceway and contacts.

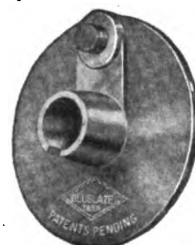
LIST PRICE
In the East.....\$3.00
In the West.....\$3.50

Other similar letters received daily.
Originals on file with us.

Dealers: Users are the best advertisers of "BLU-BLAZE TIMERS."
Ask us about sales possibilities.

**Blublaze Motor Specialties
Corporation**

Factory: 43 Seventh Ave.,
Long Island City, N. Y.



**THE FRISZ
WHEEL
& GEAR
PULLER**
**NEVER
SLIPS**



*Made in
FOUR SIZES
to take care
of all size
gears and
wheels*

Don't Waste Time and Lose Money

fussing with a wheel puller that grips poorly and slips.

Get the Frisz Wheel and Gear Puller. Its massive gripping fingers hold like a ship's anchor. They never slip and their grip is equally automatic, whether expanding or contracting. The drop forged, high carbon, nickel steel arms are always parallel with the power screw. This means a pull always in a straight pull—an easy pull.

Free from complicated parts. Needs no special attachments. Made of finest materials; heavily reinforced where stresses come heaviest.

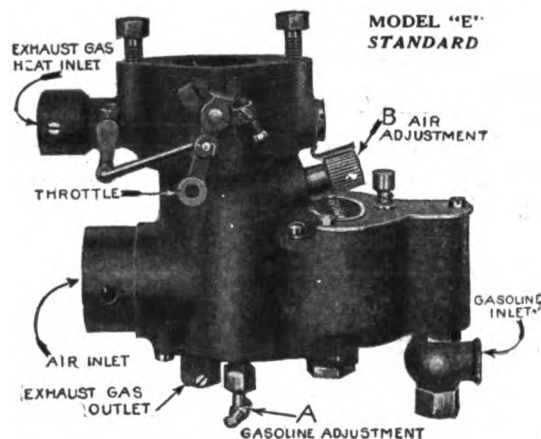
Get the Frisz Wheel and Gear Puller from your jobber—today.

JOBBER—Write for our interesting proposition.

FRISZ MFG. CO.

34th and Illinois Sts.

Indianapolis, Ind.



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.

FLINT, MICHIGAN, U. S. A.

the leading cylinder grinding concerns in the country. "We have drawn this class of work from a section of the country in which there is a greater variety of automobiles than in any other one district," says the Dyer company, "and as a result Dyer engineers have had to meet every requirement necessary for perfection in a very large variety of replacement pistons and their parts."

Dyer replacement parts are guaranteed correct in every particular and of the finest quality. They are made in a modern plant by modern methods and under thorough, expert supervision.

Those wishing to obtain a copy of the Dyer piston directory for 1923 should write the Dyer Co., 155 Brookline street, Cambridge, Mass.

Soldering Easy When You Know How—This Book Tells How.

An exceedingly interesting and informative booklet is being offered by the M. W. Dunton Co., 670 Eddy St., Providence, R. I., which includes not only a clear and concise compilation of instructions for doing a successful job of soldering, but also gives a number of "stunts" in the way of soldering which can be done with the aid of "Nokorode."

There are also several pages of valuable information on radio work which will be of interest to radio "fans."

This helpful little book can be had for a very small sum, and has been prepared by the manufacturers of Nokorode with the hope of helping others by suggestions of economy.

A Distinctive Product at a Popular Price Found in M. & R. Timer.

A particularly interesting feature of the M. & R. timer is its fiber raceway of patented construction, which is made in four sections from the finest naturally seasoned rock grain fiber.

This construction is designed to permit expansion and contraction without warping, which is one of the causes of the roller bouncing and forming humps in the raceway.

A patented retaining ring binds the four-piece race-way and, in combination with the fiber washer fitted around the contact where it goes through the shell, keeps the race-way absolutely rigid so that the posts cannot touch the shell and short circuit.

The oiler is of the spring-top type, is self-closing and is of sensible size and nickel finish.

The handle is made in one piece and is securely attached to the shell.

Steel, which has been specially prepared to stand wear equal to the fiber raceway, has been used for the contact segments, which cannot work loose.

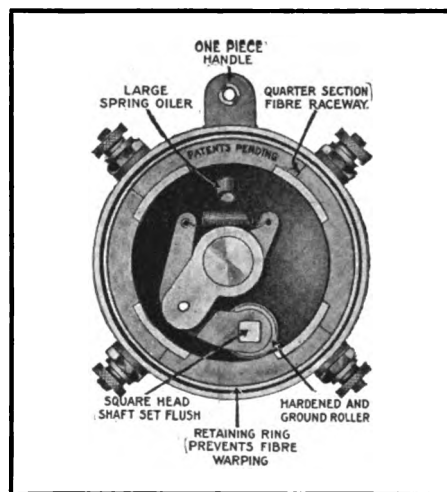
Another feature to be noted is the brush assembly, which is accurately machined and

is so assembled that the roller will bear squarely upon the contact segments, thus, it is said, assuring absolute contact at all times, particularly at low speed.

Carbon steel, which has been hardened and face ground true, hole drilled and reamed, is used in constructing the roller.

The spring is made of high-grade piano wire, which is flexible yet strong.

In the process of assembling, all M. & R. timers are subjected to tests in order to eliminate any possibility of defect in construction. The shell is gaged for size and



M. & R. Timer Has Fiber Raceway of Patented Construction.

roundness, each contact post is tested separately for short circuit and, as a final check, the complete timer is mounted on a shaft as it would be on the car. It then receives its final "O. K." and is packed in an individual carton.

Every M. & R. timer is fully guaranteed by the manufacturer against any defects in material or workmanship and to give perfect satisfaction.

Those wishing to obtain further details regarding the M. & R. timers should write to the McCulloch Mfg. Co., 216 High street, Boston, Mass.

Here's a Book That Will Interest You, Mr. Repairman!

An exceptionally instructive catalog for the battery and automotive electrical repairman has just been issued by the W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Phila., Pa., pioneer suppliers of everything in the automotive electrical industry.

The catalog is invaluable, insofar as it not only gives full information on the products which this concern manufactures and distributes but also contains several charts showing equivalent sizes of such material as battery plates, battery separators, battery boxes, replacement coil specifications, and a complete list of all ignition parts for automobiles from 1915 to 1921, inclusive. It also has a chart dealing with starter and generator brushes required for each car.

While the supply of these valuable books lasts you can secure a copy, without charge, by communicating direct with the W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Phila., Pa., on your letter-head.

BOOK REVIEW.

PNEUMATIC TIRES, by Henry C. Pearson, Editor of The India Rubber World. Published by The India Rubber Publishing Co., 25 West 45th St., N. Y., 1323 pages, 900 illustrations, 6 ins. by 9 ins.; price \$12.

If you wish to gain a thorough knowledge of pneumatic tires, from the ground up, you can do no better than to get a copy of this new book, the author of which is a practical rubber man, having made tires and studied the subject in the leading tire factories of the United States and Europe.

This is not a wholly technical publication on tire manufacture, for it is written with a view of presenting practical and helpful information to everyone handling, repairing or using tires. Whether you are a tire manufacturer, builder, dealer, repairer or user, you will find in this volume a wealth of valuable and instructive details which can be of inestimable worth to you in handling tires in any way.

And it is entirely accurate to say "from the ground up," for Mr. Pearson takes his readers back to the Far East and shows them the origin of india rubber as a tropical product, how it is gathered and marketed and its progress from that stage on up to the finished product.

Some idea of the scope of this unusually complete treatise may be gained from the following chapter headings:

Theory of the Pneumatic Tire; History of the Pneumatic Tire; India Rubber, Wild and Cultivated; Preliminaries in Rubber Manufacture; Calenders and Calendering; Rubber and Gutta Percha Cements; Spreaders and Impregnators; Pneumatic Tire Fabrics; Cord Tire Fabrics and Cord Tires; Bias Fabrics; Tread Making and Applying Machinery; Bead Making and Applying Machinery; Building and Vulcanizing Cores; Tire Building Stands; Tire Molds; Tire Building; Cloth Wrapping Machines; Cord Tire Manufacturing Machinery.

Vulcanizers and Presses; Tire Finishing Machinery; Tire Fillers; Flaps, Reliners and Blowout Patches; Tire Tests and Testing Machines; Tire Sizes and Inflation; The Manufacture of Bicycle and Motorcycle Tires; Inner Tubes; Machinery for Making Inner Tubes; Tire Rims and Fastenings; The Tire Pump; Valves for Pneumatic Tires; Tire Tools and Accessories; Treads and Anti-Skidding Devices.

The Care of Tires; Inner Tube Repair; Fabric Tire Repair; Retreading Tires; Cord Tire Repair; Tire Rebuilding; Repair Shop Machinery and Equipment; Roads for Tires; What Becomes of Worn-Out Tires; The Tire Industry of Today; Tire Machinery Patents.

LEATHER

Automotive Products



Wetprufe

Wetprufe Flat Fan Belting
Vee-Flex, Vee-Sol and
V-Lag Roll Fan Belting
Tough-Tan Leather V-Belts
Group Fan Belts
Leathertex and Wetprufe
Cone Clutch Facings
Universal Joint Discs
Anti-Squeak Lacing

INCREASE your profits—make more sales and better satisfied customers. Genuine leather products have come back into their own. They are better than substitute materials and **now are as low priced.** That's why every dealer should be interested in our complete line—

Sold by leading dealers everywhere. Ask your jobber for full information or write today for our complete catalog and discounts.

HIDE, LEATHER & BELTING CO.

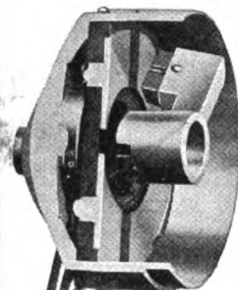
Established 1870

DETROIT
EVANSVILLE

INDIANAPOLIS

MEMPHIS
NEW YORK

We Stand Behind the FRM Dealer



We have perfect faith in this product because we know of service like this—

Dear Sirs: September 25, 1922.

I am still using the F R M installed this spring and it is working as good as ever, in fact I haven't looked at it since putting it on the car, nor have I cleaned a spark plug in over 15,000 miles.
—R. J. C.

NO PLUGS TO CLEAN

The longer firing period of the F R M keeps a spark in the cylinder until stroke is completed and it does keep plugs clean. It also gives the motor more pep and pull.

500 New Dealers and Jobbers this Month
Today is your lucky day if you join them.

Thirty Days' Free Trial
ONE YEAR GUARANTEE

FRM Manufacturing Co.

Fairbury, Illinois
Department B

The Utmost

a piston ring can do for you

STOP OIL PUMPING
HOLD PERFECT COMPRESSION
OUTWEAR ALL OTHERS
HAVE EQUARADIAL EXPANSION
EVERY 30 DEGREES; 12 POINTS
CENTRALIZE PISTONS

The above are facts, let us prove them to you, write or wire,

UNIVERSALLY SUPREME!
KENDELL

MOST PERFECTED PISTON RINGS



KENDELL ENGINEERING CORPORATION
Fort Wayne, - - - - - Indiana

BLACK AND WHITE Valve Grinding Compound!

Black & White CUTS!

It's the fastest-cutting, smoothest-working GOOD valve-grinding compound you have ever used.

LIGHT PRESSURE, MIGHTY QUICK CUT

Finishes valve seats in half the time—smooth as silk—and never leaves a ridge.

DISTRIBUTORS

Some Desirable Territory Still Open

Abrasives Sales Corp.

17 East 49th Street

New York, N. Y.

Factory, Mt. Vernon, N. Y.

BLACK & WHITE
VALVE GRINDING COMPOUND

In short, in "Pneumatic Tires," you have a veritable encyclopedia of the whole tire industry as well as a practical hand-book arranged and indexed for ready reference.

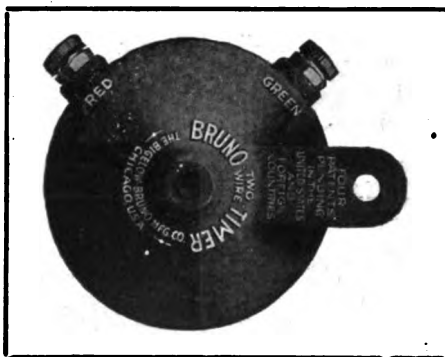
Simplicity and Dependability Features of Bruno Timer.

It is said of the Bruno timer that "The Things That Wear Are Not There," and here are some of the features that are making this timer so popular with Ford owners:

The Bruno timer has only two wires and but one moving part, and its operation is positive under all conditions.

Its case of Bakelite is short-circuit-proof, rust-proof, moisture-proof and oil-proof. The revolving contacts and the stationary contacts are made of pure copper, and brush holders are of brass, thus making a complete electrical circuit composed entirely of brass and copper.

Owing to the construction of the Bruno two-wire timer, no congealed oil film can prevent perfect contact, it is stated, and, therefore, the contact is just as perfect in



Bruno Timer Has Two Wires and Only One Moving Part.

zero weather as in warm weather. No dirt, grease, oil or water can prevent perfect contact. At high speed or low speed, the Bruno is designed to give perfect contact always, and so will deliver billions of fat hot sparks to the cylinders of the motor without a miss.

Further claims are: That the coils last longer with a Bruno timer, for the reason that the high amperage given off by the magneto at high speed is equalized in two coils and the burning of the oil points thus eliminated; that the magneto lasts longer

because the short circuits, grounds and fouled plugs which are very damaging to any magneto and tend to de-magnetize the magnets and reduce efficiency are avoided by the construction of a Bruno timer; that more power is given to the car because no unburned gases can remain in any of the cylinders after the explosion occurs, and, therefore, there is always a clean combustion chamber ready to take a pure charge of gas, which naturally results in a good strong explosion that gives more power and greater speed.

The installation of the Bruno two-wire timer is very simple. The contact maker, timer cases and the wires cannot be put on wrong. No oiling is required and oil cannot affect its operation.

The working parts are in the center of the timer—away from dirty oil, grit and metal particles. All foreign matter is thrown off by the contact maker revolving with the camshaft by centrifugal force, and it naturally goes to the bottom of the timer case where it can do no harm.

You will want to know more about this timer. Write The Bigelow Bruno Mfg. Co., Dept. C, 537 S. Dearborn St., Chicago, for complete details, prices, etc.

Up-to-the-Minute Garage Equipment

Three Dandy New Ones Added to Stevens Speed-Up Tools.

Several new and interesting tools have recently been added to the line of Stevens Speed-Up tools, which are being marketed by Stevens & Co., of New York City.

These include the Stevens piston oil-groove tool and oil-return hole drilling jig for Fords, a tool which is designed not only for chamfering an oil-groove, but also to serve as a jig for drilling the oil-return holes.

This tool chamfers the lower edge of any groove in the piston at exactly the correct angle, it is said. The cutter is made of an excellent grade of tool steel, and it has proper clearance to obtain a clean, smooth cut. The feed screw has a stop to prevent an accidentally deep cut.

A bar is furnished for turning the piston. When the tool is fastened to the bench, the piston is inserted disassembled, but when the tool is clamped vertically in a vise, the piston may be inserted with the connecting rod and turned by passing the bar through the connecting-rod bearings.

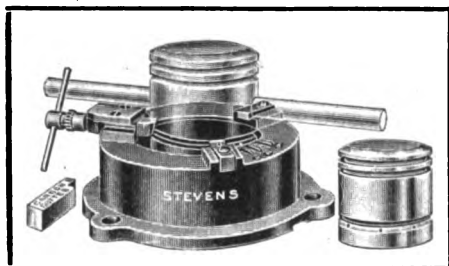
The tool is also equipped with a carbon cutter. This quickly replaces the chamfering cutter and is designed to completely remove all the burnt deposits from the bottom of the ring groove.

One of the steel jaws is designed as a jig to drill oil holes. The face of the tool is marked with spacing divisions for locating the holes at any desired intervals. The number of oil holes required depends upon

the condition of the piston and cylinder wear, but as a rule, four to six holes are sufficient.

This method, it is declared, will cure the most persistent cases of oil pumping, and its application requires only about ten minutes to the piston.

Two other valuable tools which have



Stevens Piston Oil-Groove Tool for Ford.

been added to the Stevens line are found in the Stevens puller and the Stevens driver.

The first of these is designed for drive shaft sleeve Ford No. 2596. The Stevens puller has steel jaws that completely surround the sleeve, so that any required pressure can be applied through the large steel screw without injury to either the sleeve or the shaft.

The inside is machined to a close fit on the sleeve to prevent the tool from springing out of line or jumping off under pressure. The square bosses on the sides are for securing the tool in a vise.

The second tool, the Stevens driver, has

a novel feature. It is provided with a "sight," consisting of a special notch and pin, which insures the proper alignment of the keyway slots as the sleeve is driven into place. It drives the sleeve with absolute safety. This tool is turned from steel rod.

Further details concerning these tools can be obtained upon request from the manufacturer, Stevens & Co., 375 Broadway, New York, N. Y.

Tires Changed in Sixty Seconds with Excelsior Rim Tool.

The tool was prominently displayed, for "Dealer Ben" was one of those present day merchants who realize that you must let people know you have the goods if you expect to sell them.

Besides, he knew the merits of the article and it was his policy to feature accessories which he felt would be good sellers and give satisfaction. "Because," said he, "satisfied customers have built my business."

So he had placed an attractively-arranged table of automobile accessories where it would be most likely to catch the eyes of visitors to the shop. For the center he chose as his feature article an Excelsior rim tool. With the aid of a tire attached to a rim and a lithograph figure of a man which, because of its size, was quite life-like in appearance, he had ingeniously arranged the display so that it gave a very

Ganschow Gears

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For every automotive need

Repairmen from near and far have found it worth while to order their gears from us because they are always able to get what they want when they want it. We furnish promptly transmission, differential or silent-timing gears. The quality of Ganschow Gears is almost proverbial.

Feel free to consult our engineering department.

Let Us Quote You

WM. GANSCHOW COMPANY
1002 Washington Boulevard
Chicago, Illinois




Sentree

Guards Engine Efficiency

Auto Owners everywhere buy the Sentree on sight. Because this device guards motor efficiency by condensing vapors or anti-freeze solutions back into liquids keeping water supply constant—thus preventing overheating. It also warns of low water, etc. If first warning is not heeded, Sentree whistles until trouble is remedied.

Neat and attractive—no delicate parts—no glass to break—no wiring or complex parts to get out of order. Price \$8.50. Every car owner is a prospect. Some one will sell them in your territory. Will it be you? Write now for complete description.

Alert Alarm Company
607 N. La Salle St.
Chicago



The Bruno Two Wire Timer

is a profit maker for any dealer. Read why!

This unique timer has but two wires and a single moving part. It is a product of modern inventive genius and, due to its scientific design, it incorporates certain features of **ECONOMY, INCREASED POWER and DURABILITY** that cannot be found in any other timer.

BAKELITE "SHORT PROOF" CASE

The case of Bakelite is short, rust, moisture and oil proof. The contacts are made of pure copper and the brushes are copper.

IT REQUIRES NO OIL

The BRUNO is in fact a "troubleless timer," no oil is required in its operation and the simple two wire construction eliminates the wires next to the fan belt. It will outlast any other timer made. It eliminates misfires, prevents the fouling of plugs and eliminates carbon caused by poor combustion.



\$4.00 DELIVERED ANYWHERE IN THE U. S. A.
On receipt of \$4.00 cash, check or money order, it will be sent you direct complete with wires, with all shipping charges prepaid.

STATE DISTRIBUTORS AND DEALERS WANTED

Write for full particulars of a highly profitable connection. This fast-selling accessory is nationally advertised.

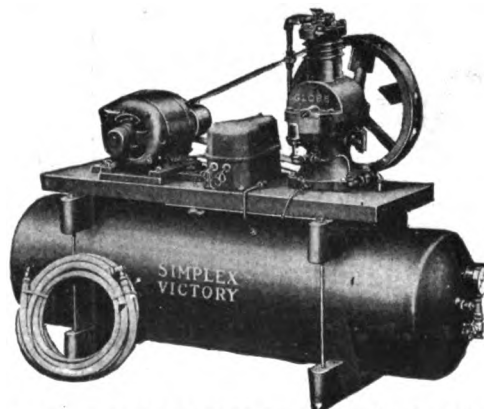
THE BIGELOW BRUNO MFG. CO.
Dept. C
537 Dearborn Street CHICAGO, ILL.

THERE HE GOES

Another good customer lost because the old compressor has fallen down on the job just when he wanted his tires filled.

WELL, YOU DON'T HAVE TO LET HIM GO.

Hold your old customers and make new ones with a dependable air supply—



GLOBE SIMPLEX TWO-STAGE COMPRESSOR

Guaranteed to Pump more air for the amount of current consumed than any other type of compressor on the market. High in efficiency—Low in operating cost—Simple in construction—Reasonable in price and on the job all the time.

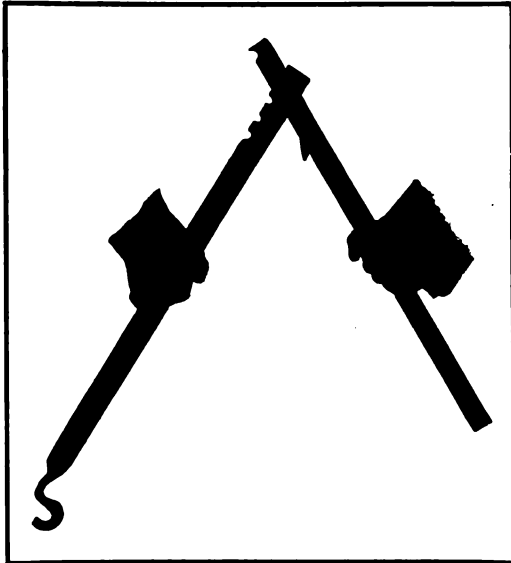
DON'T WAIT. BUY NOW AND LET THE SIMPLEX END YOUR AIR TROUBLES.

GLOBE MANUFACTURING CO.
Battle Creek, Mich.

accurate idea of the ease with which a rim may be contracted when an Excelsior rim tool is used.

The display attracted Bell's attention one morning when he and Mrs. Bell stopped at the shop to purchase a tire.

"It's a practical tool in every way," Ben told him. "And, as you can see, is simple



Excelsior Is Easily Assembled.

in design and construction and very easily operated. There are no parts to lose, clamps, bolts or sliding arms to adjust. Simply grasp a part in each hand, insert the notched end of the cross-bar in the open slot of the handle into the notch corresponding to the size of the rim."

"It will fit any size and make of split rims. Whether straight side or the clincher type, the operation in every instance is the same. It will lock and unlock any make of split rim without injury to either the tire or the rim. You won't dread that 'second puncture' if you take an Excelsior

along with you on your next trip, and you'll find that you can change your tire in less than 60 seconds."

"Strength is not necessary, as a woman can operate it with ease. Ten pounds pressure exerted on the lever multiplies 18 times, giving 180 pounds at the contracting or expanding points."

"Better get one, Jim," suggested Mrs. Bell, whose interest had increased quite visibly upon the dealer's statement that the tool could be so easily operated. "You know I have to drive that car sometimes."

Thus the deciding vote was cast and Bell carried away with him an Excelsior rim tool.

"It isn't just car owners that are interested in this Excelsior rim tool," says Dealer Ben. "I know garagemen who say that it excels for removing and replacing automobile tires used on split, demountable rims. It saves them time and work, and they can take the tool to the work instead of taking the work to the tool."

The Excelsior rim tool is made of steel and is fully guaranteed. Full details can be obtained from the manufacturer, The West Tire Setter Co., 255 Mill St.,

Rochester N. Y., upon request.

A Booklet for Garagemen Who Want Better Business.

If you are in any way doubtful as to the great importance of proper shop equipment in promoting business for your shop, the reading of this pamphlet will go far to convince you.

"The Backbone of Automotive Service" has just been issued by Jacobs Mfg. Co., of Hartford, Conn., in conjunction with the campaign now running in automotive trade publications to promote a more general appreciation of the importance of adequate shop equipment, and solely for the information and guidance of service stations and repair shops.

The products referred to in the booklet are not those of any specific make, the purpose of the publication being simply to suggest ways of improving shop practice and increasing service profits.

Descriptions of lathe, drill press, portable electric drill, cylindrical grinder, cylinder and arbor press, together with the functions of these machines in the modern shop are given, showing conclusively the value to the garage and service station of the installation of suitable shop equipment.

Write the Jacobs Mfg. Co., 2074 Park St., Hartford, Conn., for your copy.

"The Story of Patches" Shows Road to Greater Profits.

"I wonder if this tire is too far gone to be worth fixing," the customer asked us he rolled a badly blown-out casing up to the counter.

"Well, if you mean vulcanizing," replied Duncan, the Shop Manager, "I'd say it wasn't worth it. But I take it you believe you're entitled to more mileage from that tire, and if that's what you're after we can get it for you."

That's the way the story begins, but we won't tell you how it ends, because you will want to read this book and learn for yourself just how Duncan, the shop manager, could so confidently assure his customer that he could give him more mileage from the tire which seemed to the owner too far gone for repairs.

The question of how to increase shop profits is uppermost in the mind of every progressive garageman and repairman nowadays, and naturally each one is eager to know of anything that will give him new ideas along this line.

Therefore, you will not want to overlook asking for your copy of this booklet,



Using Excelsior to Contract Rim.

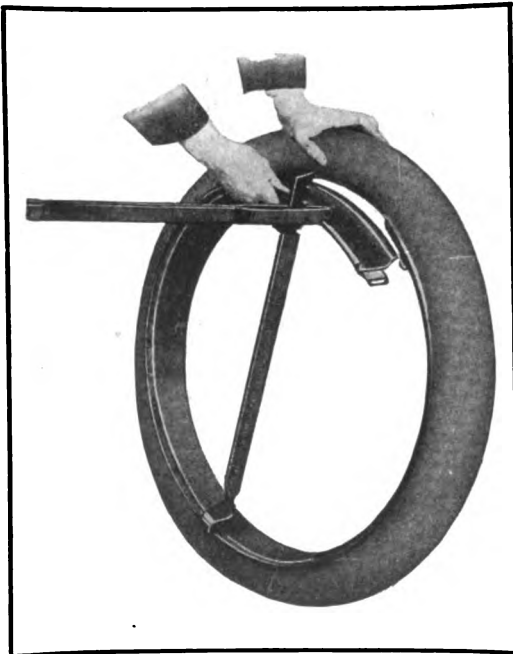
which tells in so interesting a manner "The Story of Patches," and how one shop manager was able to materially increase the efficiency of the service and the profits of his shop.

A request for the booklet, addressed to the P. S. M. Co., 3116-36 Snelling Ave. South, Minneapolis, Minn., will bring it to you promptly, without charge.

Piston Finishing Revolutionized by New Spencer-Smith Arbor.

A piston turning and grinding arbor, which is expected to revolutionize the finishing of semi-finished pistons, has been developed and is now being placed in the hands of regrinders by the Spencer-Smith Machine Co., of Howell, Mich., piston manufacturers.

This arbor has been designed by J. E.



Removing Tire With Excelsior Rim Tool.

NOW READY!

The New 1922 Issue of the **Wells' Automotive Wiring Manual**

(Sixth Consecutive Year)

New Issue! New Cover! New Price!

This nationally known, standardized and official compilation of BLUEPRINT car wiring diagrams has been thoroughly revised to include complete external wiring of all standard American cars from 1911 to date.

NOW bound in attractive and substantial loose-leaf cover, permitting easy insertion of later diagrams.

NOW the most complete, authentic and correct compilation on the market.

NOW priced at only \$12.50 delivered. Formerly \$15.00. NOW is the time to get your copy as part of your shop equipment.

Also combined in one large loose-leaf volume with Wells' Auto-Electricians' Handbook if desired. This one volume gives all available data covering both external and internal wiring, together with test and performance on every make and model (over 850) of generator, motor, regulator, cutout, etc. Price \$22.50 delivered.

Write today for descriptive circular.

Automotive Publishing Company

448 So. Dearborn Street, CHICAGO

THE PISTON YOU HAVE HOPED FOR The BU-NITE Steel Band Piston

A Thermostatically controlled piston, safeguarding the running condition of an engine.



You will want to add the piston the automobile trade has been demanding.

Write Us for Details

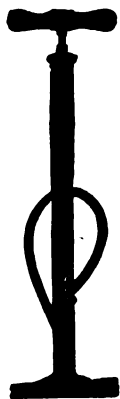
BUTLER MANUFACTURING COMPANY

Established 1897

3234 W. Washington

INDIANAPOLIS, IND.

AUTOQUIP PUMPS



No. 31. Peerless Steel Barrel Anchored into base by Patented Process. Quick acting air chuck, heavy tubing, reinforced base with special ground grip flanges.

PROFIT Plus ECONOMY

There is profit for the dealer in selling one line of pumps—if within that scope he has A SIZE — A STYLE — A PRICE to satisfy every customer. There is also economy, for his turnover is naturally big.

AUTOQUIP Pumps are so recognized.

Write today for prices and discounts. Giving name of your Jobber.



No. 31 Paramount. High grade single acting pump. LOX-on Jr. Air Chuck. Brass Tube and Brass Check Valve. Heavy Reinforced Base, length 31" over all. A LIFE LONG PUMP.

Autoquip Mfg Co. Inc.

ROCHESTER, N. Y.
MANUFACTURERS OF

LOCKTYPE ANTI-RATTLERS

LET'S HAVE THAT NEXT ORDER!

**When you need a Doctor
Do you get estimates?**

NO! you engage a Physician in whom you have confidence. That's why you use F.A.A. ALUMINUM and CAST IRON MENDS. You have confidence in them in making permanent repairs, such as scored cylinders, cracked water jackets and aluminum castings.

**F. A. A. Aluminum and Cast Iron
Mends go straight to the job.**

**Distributors—Dealers—Agents
WANTED**

F. A. ALBERTUS & CO.
206 Ninth Street, Milwaukee, Wis.
Western Distributor
CARL M. ANDERSON, Vineburg, California

Parker, factory manager of the Spencer-Smith Machine Co., with the view of shortening the time for finishing pistons by making it unnecessary to change the set-up on a lathe or grinder every time a piston of different diameter or length is to be finished.

The Spencer-Smith universal turning and grinding arbor is said to reduce the time required for grinding and turning pistons to a minimum. With this arbor, the piston is held entirely on the centers and the arbor maintains the same center distance in the lathe or grinder for every size piston—from 2 13/16 to 5 inches in diameter. Because the arbor maintains the same center distances, a turning lathe or grinder, once set up, is ready to rough-turn or finish a piston of any length and entirely eliminate any taper.

Actual tests have demonstrated, says the manufacturer, that a set of six pistons can be finished with the Spencer-Smith arbor in from 20 to 30 minutes.

With the usual time required to rough-turn and grind a set of six pistons—including the change of set-up for a piston of different length and diameter, which averages about 1½ hours—and the usual production cost for this work totaling \$2 per hour, it is declared that the Spencer-Smith arbor has demonstrated that it makes possible a saving of \$2 on every set of six pistons that is finished with it.

Because the piston is held by the Spencer-Smith arbor entirely on the dead centers, there is an absence of chatter and the finished piston is nearer round.

It is further claimed that this arbor eliminates strains resulting when the piston is held and driven from the bosses—a feature that is particularly appreciated in the finishing of light-weight pistons which become distorted around the bosses, developing high and low spots which are espe-

cially detrimental in the fitting of pistons to cylinders.

The Spencer-Smith arbor is also designed to eliminate any outward pressure which tends to throw the piston out of round.

The Spencer-Smith universal turning and grinding arbor is furnished to finish pistons of all 14 different open end diameters, as follows: 2 5/8, 2 3/4, 2 7/8, 3, 3 1/8, 3 3/16, 3 1/4, 3 3/8, 3 1/2, 3 3/4, 4, 4 1/8, 4 1/4 and 4 1/2 inches.

It enables the regrinder to obtain the best possible results in finishing pistons, assures economical and accurate production, and a quality product from a machining standpoint.

"With cylinder grinding and piston finishing becoming more and more important factors in the proper reconditioning of motor cars, it is evident that the Spencer-Smith arbor will play an important role in bringing the regrinding business to a higher standard and result in better and more profitable production methods for the regrinder," says W. M. Smith, general manager of the Spencer-Smith Machine Co.

"While we are not in the tool business, we are interested in aiding the regrinder to finish pistons accurately and economically. Accordingly, we are placing this arbor in the hands of regrinders at manufacturing cost."

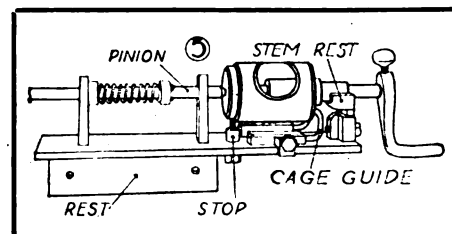
Those desiring further details concerning the Spencer-Smith arbor should write the manufacturer at the address given.

Full Service from the Buick with Valves Ground to Do It.

For use on all models of Buick sixes, the Autoquip Mfg. Co., Inc., of Rochester, N. Y., is offering a combination of tools known as the "Marvel value grinding outfit," which affords a means by which the individual car owner can grind valves in his own garage, as well as being an ex-

ceedingly useful set of tools for any garageman or repairman.

The set consists of a valve cage lifter, rocker arm lifter, cap remover, valve grinder and spring compressor, and the method of grinding the valves is a very simple one.



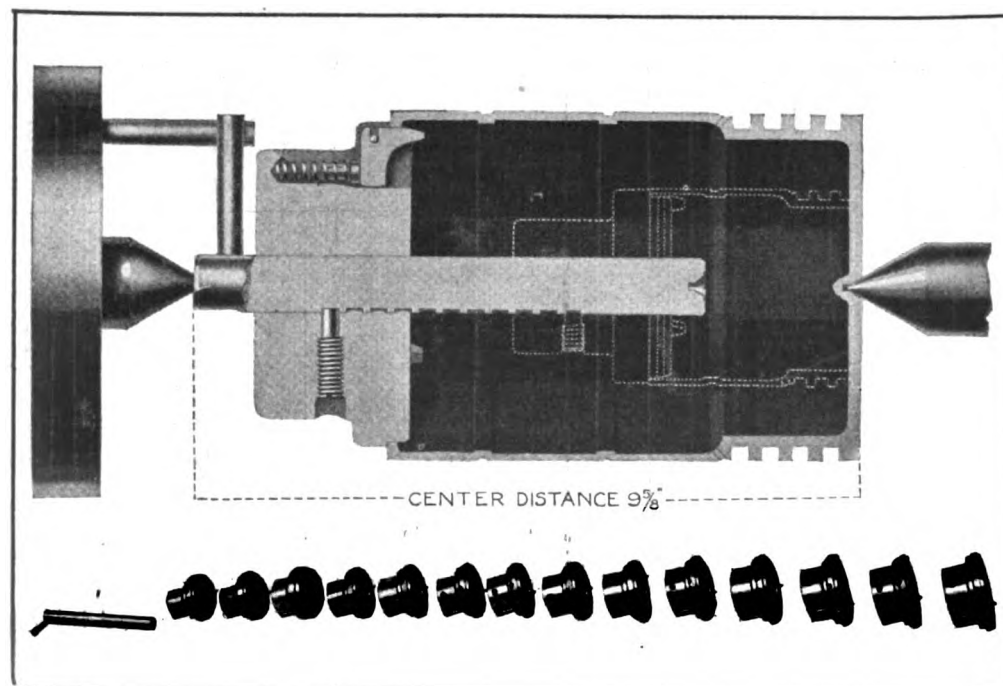
Marvel Valve Grinding Outfit.

An illustrated descriptive circular, outlining the procedure for grinding valves with this outfit will be forwarded to those interested upon request directed to the manufacturer at address given.

New High Record for Gasolene Consumption in U. S.

A new high record for consumption of gasolene in the United States was attained in the month of August, according to statistics compiled by the Federal Bureau of Mines, which show a domestic usage of 583,687,932 gallons. Consumption of gasolene in August was 3.1 per cent greater than in July, in which month a record consumption mark had also been established. Consumption figures for this August represent an increase of 16 per cent over the statistics for August, 1921.

Production of gasolene during August amounted to 549,958,376 gallons. The figures represent a decrease of approximately 20,000 gallons, or 3.5 per cent from the July output, which set a new monthly record for gasolene manufacture. Stocks of

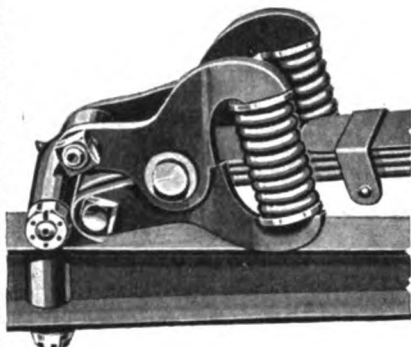


Shows Driving Arbor and 14 Adapter Heads of Which Spencer-Smith Universal Turning and Grinding Arbor is Comprised.



Star W-X Outshines All Other Ford Shock Absorbers

Give the greatest flexibility and comfort on either a normal or full load. Do not affect spring mounting of Ford Car. Simplest and easiest to install—car owner can do it himself. The biggest shock absorber ever offered at the price—\$8.00 per set of four. Three styles—No. 1 for Runabouts, No. 2 for Touring, No. 3 for Sedans. DEALERS—Here's a real money maker. Write today for full data.



STAR SPECIALTY MANUFACTURING CO.

227-233 W. Erie St.

CHICAGO, ILL.

SKINNER

MOTOR VALVE SETS



This new filing-refacer with its accurate guide bearing—its file held to a true plane—puts a true seating surface on even a warped tungsten valve. Set also includes complete reseater—shear cutter taking $1\frac{1}{8}$ " to $3\frac{1}{8}$ " valve seats, and four pilots. Skinner cutters stay sharp. Send for free treatise on valve work.

Grinder
Accuracy at
a Hand-tool
Price

M. B. SKINNER CO.
560 Washington Boulevard
CHICAGO, ILLINOIS

Every Tire Dealer Using AMERICAN GARAGE & AUTO DEALER

Should get on our mailing list

Write or wire
for our latest
Bulletin just
off the press

It is a real Money Saver
and will be sent
upon request to
those in the trade

BROADWAY TIRE JOBBERS, Inc.
250 W. 54th Street, New York City

DO ALL YOUR OWN PRESSING and PULLING

The only combination garage and auto tool on the market that quickly and easily straightens axles, presses and pulls clutches, wheels, gears, bushings, or any of the other thousand and one pressing and pulling jobs around a repair or machine shop.

Consisting of 20 pieces of forged and case hardened steel, The Universal Garage Tool is made to withstand the most severe usage and hard work. This simple, powerful, compact combination tool more than pays for itself in one overhauling.

UNIVERSAL GARAGE TOOL
COMPLETE WITH TOOL BOX

| | |
|-----------------------------|-----------------------------|
| Light Weight Set \$12.00 | Heavy Weight Set \$15.00 |
|-----------------------------|-----------------------------|

Dealers: Write for our proposition and territory

THE UNIGARTO CO.
310 South Cornell Fort Wayne, Indiana

gasolene on hand September 1 amounted to 703,738,310 gallons, a decrease of 69,000,000 gallons during the month.

Exports of gasolene in August amounted to 35,747,004 gallons, a decrease of 23,000,000 gallons compared with July. Imports were 2,829,062 gallons, a decrease of about 2,000,000 gallons. Shipments to insular possessions were 2,523,141 gallons.

During August the daily average of 1,571,000 barrels of oil run through the stills of 295 refineries reported to the Bureau of Mines as operating shows a decrease of 1.38 per cent in the amount of oil run and a decrease of 10. or 3.28 per cent, in the number of operating refineries as compared with July. Taking into consideration the greater decrease in the number of operating refineries, there is shown a relative increase of 1.96 per cent in the amount of oil run.

The kerosene output in August amounted to 184,382,897 gallons, a decrease of 4.4 per cent from the production for the previous month. Stocks of kerosene on hand September 1 were 285,520,131 gallons, a decrease of 12 per cent. Exports and shipments to insular possessions amounted to 87,316,297 gallons, an increase of 36,500,000 gallons over the July figures.

Production of gas and fuel oils in August amounted to 944,289,105 gallons, which is a slight decrease. Stocks of these oils on September 1 were 1,366,611,311

gallons, an increase of about 8,000,000 gallons.

The output of lubricating oils in August was 88,824,133 gallons, a decrease of about 3 per cent. Stocks of lubricating oils on hand September 1 amounted to 220,668,498 gallons, a decrease of 6,000,000 gallons. Exports and shipments to insular possessions amounted to 27,244,801 gallons.

Why Tires on Right Side Wear More Than Left Ones.

The fact that tires on the right-hand side of a car wear out faster in proportion than those on the left hand side, often puzzles garagemen as well as motorists. The popular supposition, that this wear is caused by turning many corners to the right is incorrect. The fact is that the increased wear is actually caused by the pitch of the road, which throws more of the car on the right side than on the left.

The round of the road from curb to curb is far more important to determining the sequence in which tires normally

wear but—right rear, left rear, right front, left front—than are gutter wear and abrasion from grinding off and on pavement.

The slope of the road causes the right rear tire to carry more weight than the left rear tire. Thus the right rear wears the faster of the two. The right front also, according to Miller tire and tube experts, will wear more rapidly than the left front for the same reason.

However, as the left rear wheel receives a driving pull while the right front does not, it will wear the faster of the two. Under average conditions, it will be found that the right rear tire wears out first and the left front last.

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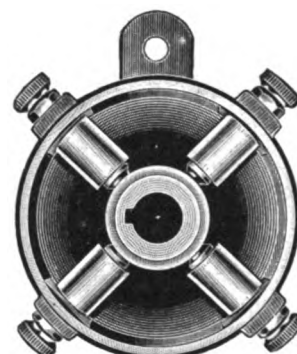
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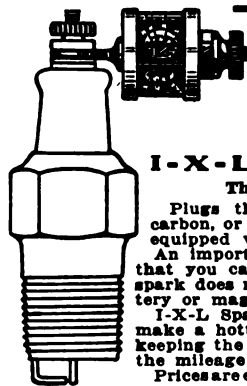
Ever have troubles when you're prying out the valve assembly with screwdrivers and crowbars? Don't! Use the Buffum tool—and assure your customers of clean valves—not broken parts.

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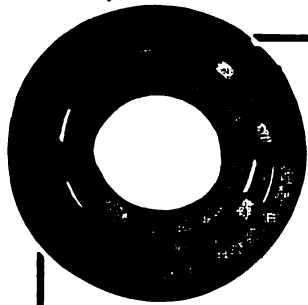
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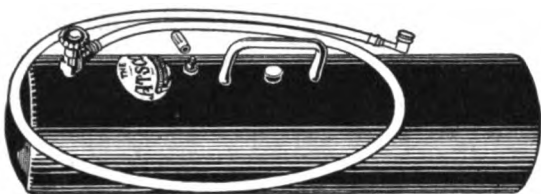
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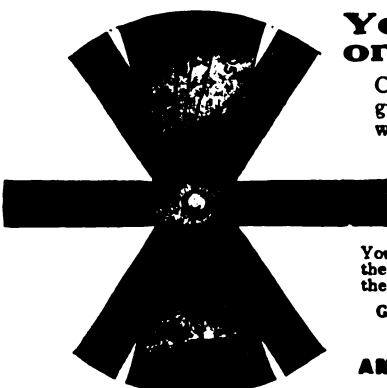



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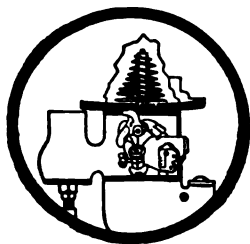
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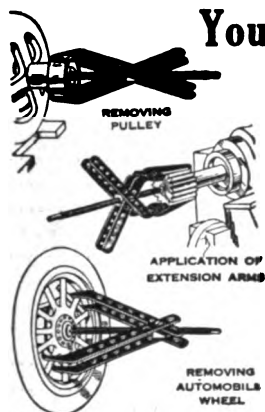
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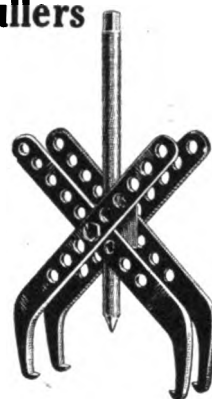
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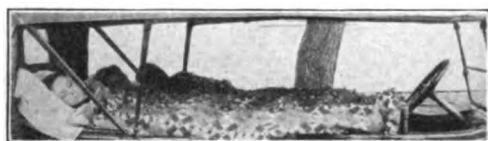
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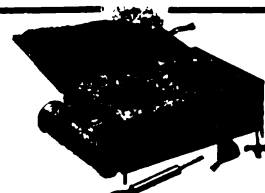
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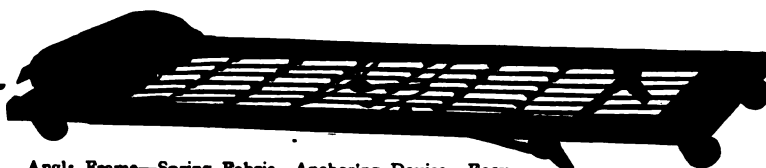
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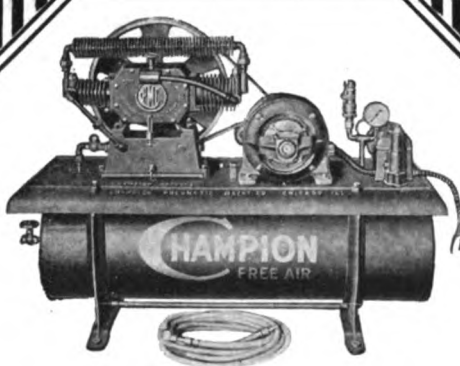
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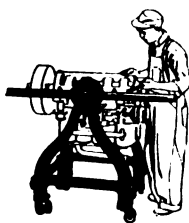
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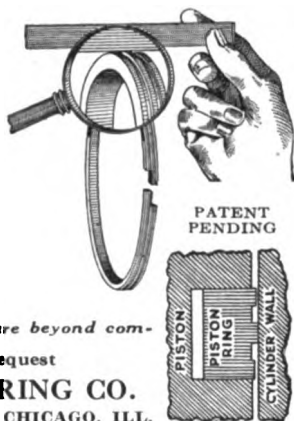
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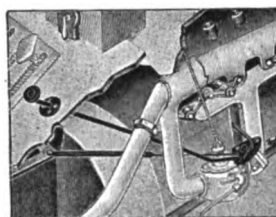
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Notice—Dealers who are interested in securing the most profitable and aggressive sales co-operation ever offered on an automobile product will please write direct to manufacturers.

ROBERT M. BOWES CO.,

INDIANAPOLIS

BUYERS' REFERENCE

AIR COMPRESSORS

Brunner Mfg. Co., Utica, N. Y.
Champion Pneumatic Machinery Co., 8164 S. Chicago Ave., Chicago.
Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.
Globe Mfg. Co., Battle Creek, Mich.

AIR HOISTS

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

AIR TANKS

Air Tight Steel Tank Co., Pittsburgh, Pa.

AMMETERS (POCKET and DASH)

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, Ohio.

ANTI RATTLES (Window)

Autoquip Mfg. Co., 495 W. St. Paul St., Rochester, N. Y.

AUTO ELECTRIC SUPPLIES

H. P. Manly, 1010 S. Michigan Ave., Chicago.

AUTO POLISH

Chemical Co., Steger, Ill.

AXLES (EMERGENCY)

H. G. Paro Co., 1410 S. Michigan Ave., Chicago.

AXLE STRAIGHTENERS

The Unigarto Co., Ft. Wayne, Indiana.

BATTERIES

Stewart Storage Battery Co., Central Ave. at Sixth St., Marshfield, Wis.
W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

BATTERY REPAIR & TESTING EQUIPMENT

W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

BEARINGS

Western Bearings Co., 2831 S. State St., Chicago, Ill.

BOOKS

Automotive Publ. Co., 448 S. Dearborn St., Chicago.
American Technical Society, Chicago, Ill.

BOOKKEEPING AND ACCOUNTING SYSTEMS

Comfort Printing Specialty Co., 101 No. 8th St., St. Louis, Mo.

BORING MACHINES

Winterknight Equipment Co., 1327 Race St., Philadelphia, Pa.

BRAKE AND TRANSMISSION LININGS

Mikecell Bros. Co., 156 N. La Salle St., Chicago.

BREEZE BRACKETS

Buckett Breeze Bracket Co., Lincoln, Nebr.

BUMPERS

Metal Stamping Co., Long Island City, N. Y.

BUSHING REMOVERS

Albertson & Co., Sioux City, Iowa.

CAR HEATERS

Rosier Howard Corp., Hutchinson, Kansas.

CARBURETORS

The Kokomo Electric Co., Kokomo, Ind.

CLEANERS

Marvel Carburetor Co., Flint, Mich.

CLUTCH FACINGS

Mikecell Bros. Co., 156 N. La Salle St., Chicago.

COUPON BOOKS

National Checking Co., 269 Chestnut St., St. Paul, Minn.

COVERS

Kennedy Car Liner & Bag Co., Shelbyville, Ind.

CRANES

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

CREEPERS (For Repair Shops)

Foster Bros. Mfg. Co., Utica, N. Y.

CYLINDER REBORING AND EQUIPMENT

Butler Mfg. Co., Indianapolis, Ind.
Storm Mfg. Co., Minneapolis, Minn.

CYLINDER REGRINDING

Trindl Co., 2917 S. Wabash Ave., Chicago.

CYLINDER GAUGES

Am-pé-co Sales Co., Marshalltown, Iowa.

DUST CAPS

A. Schrader's Son, Inc., Brooklyn, N. Y.

ELECTRICAL REPAIRS

Sampson Electric Co., 2334 So. Wabash Ave., Chicago.

ELECTRICAL TESTING EQUIPMENT

Automotive Electro Technologist, Box 115, Fullerton, Cal.

ELECTRIC FURNACES

H. P. Manly, 1010 S. Michigan Ave., Chicago.
W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

ENGINE STANDS

Continental Auto Parts Co., Columbus, Ind.

EXTENSION REELS

Akme Auto Products, 425 Jefferson Ave., Rochester, N. Y.

FAN BELTS

Hide, Leather & Belting Co., 229 S. Meridian St., Indianapolis, Ind.

FIRE FIGHTING EQUIPMENT

Flexlume Sign Co., Niagara St., Buffalo, N. Y.

GARAGE EQUIPMENT

Continental Auto Parts Co., Columbus, Ind.
H. G. Paro Co., 1410 So. Michigan Ave., Chicago.

GASOLINE PUMPS AND TANKS

Wayne Tank & Pump Co., Fort Wayne, Ind.

GEARS

Wm. Ganschow Co., 1002 Washington Blvd., Chicago, Ill.

GEAR AND WHEEL PULLERS

Continental Auto Parts Co., Columbus, Ind.

GREASE GUNS

Frank Rose Mfg. Co., Hastings, Neb.
H. G. Paro Co., 1410 So. Michigan Ave., Chicago.

GREASE PUMPS

H. G. Paro Co., 1410 Michigan Ave., Chicago.

HOOD SILENCERS

H. G. Jorgensen, Hampton Road, Erie, Pa.

LENSES

C. A. Shaler Co., 372 Fourth St., Waupun, Wisconsin.

LIGHTING WIRE ASSEMBLIES

Turner Mfg. Co., Kokomo, Ind.

MAGNETO METERS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

NEUTRAL PEDALS

Burnham-Cote Co., Holyoke, Mass.

OIL PUMPS AND TANKS

Wayne Tank & Pump Co., Fort Wayne, Ind.

American Oil Tank & Pump Co., Cincinnati, Ohio.

OILS AND LUBRICANTS

Consumers Oil Co., 225 No. Michigan Ave., Chicago, Ill.

National Refining Co., 2003 Rose Bldg., Cleveland, Ohio.

OIL SHIELDS

Burnham-Cote Co., Holyoke, Mass.

PACKINGS

Mikecell Bros. Co., 156 N. La Salle St., Chicago.

PARTS, SERVICE

North East Service, Inc., Rochester, N. Y.

PISTONS

Am-pé-co Sales Co., Marshalltown, Iowa.
Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON PINS

Burgess-Norton Mfg. Co., Geneva, Ill.

PISTON RINGS

Butler Mfg. Co., Indianapolis, Ind.
Krasberg Piston Ring Co., 117 No. Jefferson St., Chicago.

Kendall Engineering Co., Fort Wayne, Ind.

Leeseberg Machine & Mfg. Co., Fosterla, Ohio.

Trindl Co., 2917 So. Wabash Ave., Chicago.

PISTON RING COMPRESSORS

Waglow Mfg. Co., 700 Manlius St., Syracuse, N. Y.

POLARITY INDICATORS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

PRESSSES

Continental Auto Parts Co., Columbus, Ind.

PRESSING AND PULLING MACHINE

Unigarto Co., 310 South Cornell, Fort Wayne, Ind.

PUMP CONNECTION

A. Schrader's Son, Inc., Brooklyn, N. Y.

PUMPS

Air-Tight Steel Tank Co., Pittsburgh, Pa.

Autoquip Mfg. Co., 495 W. St. Paul St., Rochester, N. Y.

Frank Rose Mfg. Co., Hastings, Neb.

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

RADIATOR CAP CONDENSERS

Alert Alarm Co., Chicago, Ill.

RADIATORS

Jaffe Radiator Co., 741 W. Van Buren St., Chicago.

REAMERS

Watervliet Tool Co., Albany, N. Y.

REBABBITTING SERVICE

Indiana Watkins Co., Indianapolis, Ind.

RESEATING REAMERS

Albertson & Co., Sioux City, Iowa.

RECTIFIERS

Sterling Mfg. Co., Cleveland, O.

RIM SREADER

West Tire Setter Co., Rochester, N. Y.

RUNNING BOARD MATS

Mikecell Bros. Co., 156 N. La Salle St., Chicago.

SHOCK ABSORBERS

Indiana Parts Co., Richmond, Ind.
Star Specialty Mfg. Co., 227-223 W. Erie St., Chicago.

Philip H. Webber & Co., Hoopeston, Ill.

SIGNS
Flexlume Sign Co., 25 Kall St., Buffalo, N. Y.

SOLDER

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

SOLDERING FLUX

F. A. Albertus & Co., 206 9th St., Milwaukee, Wis.

Benson Co., A. R., Hudson, N. Y.

Chicago Solder Co., 4210 Wrightwood Ave., Chicago.

M. W. Dunton Co., The, Providence, R. I.

SOLDERING OUTFITS
M. W. Dunton Co., The, Providence, R. I.

SPARK PLUGS

Leich Electric Co., Genoa, Ill.

Allen Specialty Co., 2751 W. Lake St., Chicago, Ill.

SPARK PLUG INTENSIFIERS
Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

SPRING LEAF LUBRICATORS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

STORAGE BATTERY TESTERS

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

TESTING INSTRUMENTS

Leich Electric Co., Genoa, Ill.

H. P. Manly, 1010 S. Michigan Ave., Chicago.

W. F. Price Battery Supply Co., Inc., 3300 N. Broad St., Philadelphia, Pa.

TIMERS

Bigelow-Bruno Mfg. Co., 537 South Dearborn St., Chicago, Ill.

Blublaize Motor Spec. Corp., 43 Seventh Ave., Long Island City, N. Y.

Dale Mfg. Co., 1328 S. Michigan Ave., Chicago.

F. R. M. Mfg. Co., Fairbury, Ill.

Leich Electric Co., Genoa, Ill.

McCullough Mfg. Co., 216 High St., Boston, Mass.

Spad Mfg. Co., Inc., 42-B W. 39th St., New York City.

Turner Mfg. Co., Kokomo, Ind.

TIRE PRESSURE GAUGE
A. Schrader's Son, Inc., Brooklyn, N. Y.

TIRES

Geo. K. Culp, Inc., 56 W. 45th St., New York.

Broadway Tire Jobbers, 250 W. 54th St., New York City.

TIRE CARRIERS

International Stamping Co., 400 N. Leavitt St., Chicago, Ill.

TIRE REPAIR EQUIPMENT

Robt. M. Bowes Co., Indianapolis, Ind.

Atlas Auto Supply Co., 680 W. Austin Ave., Chicago, Ill.

TORCHES

Turner Brass Works, Sycamore, Ill.

TOWN PLATES

Frank G. Hough Co., Chicago, Ill.

TROLLEYS

Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.

TRUSSES (FOR GARAGES)

Leo McDaniel Contracting and Engineering Co., Cairo, Ill.

TUBES

Broadway Tire Jobbers, 250 W. 54th St., New York City.

VALVE CUTTERS AND REFACERS

M. B. Skinner Co., 552-553 Washington Blvd., Chicago.

VALVE CAPS AND VALVE INSIDES

A. Schrader's Son, Inc., Brooklyn, N. Y.

VALVE REPAIR TOOL
A. Schrader's Son, Inc., Brooklyn, N. Y.

VALVES

Romort Mfg. Co., Oakfield, Wis.

VALVE GRINDERS

Albertson & Co., Sioux City, Iowa.

Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.

VALVE GRINDING COMPOUNDS
Abrasive Sales Corp., 17 E. 49th St., New York City.

VALVE REFACING TOOLS

Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.

VALVE REMOVERS

Buffum Tool Co., Louisiana, Mo.

VOLTMETERS (POCKET and DASH)

Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.

VULCANIZERS

C. A. Shaler Co., 353 Fourth St., Waupun, Wis.

VULCANIZING EQUIPMENT

R. G. Haskins Co., Chicago, Ill.

P. S. M. Co., Minneapolis, Minn.

Saint Louis Machine Tool Co., St. Louis, Mo.

WEIDING EQUIPMENT
Bastian-Blessing Co., Chicago, Ill.

F. A. Albertus & Co., 206 9th St., Milwaukee, Wis.

Muller Flexible Shaft Co., St. Paul, Minn.

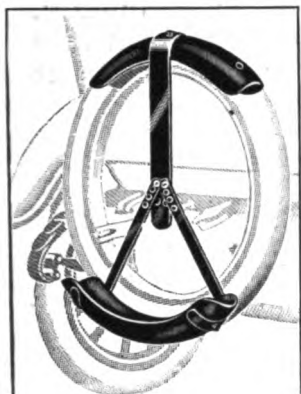
St. Paul Welding & Mfg. Co., 165 W. 3rd St., St. Paul, Minn.

WORK BENCHES (Portable)
Continental Auto Parts Co., Columbus, Ind.

Not Just ONE Profit But

→ 2-R-3 ←

When you sell a 2-R-3 TIRE CARRIER you not only collect one nice profit but pave the way for 2-R-3 more.



Model Y

Simply by showing the 2-R-3 Tire Carrier many car owners may become immediate prospects for a tire, a tube, a rim, and a tire lock; things that they need but did not know how to carry them.

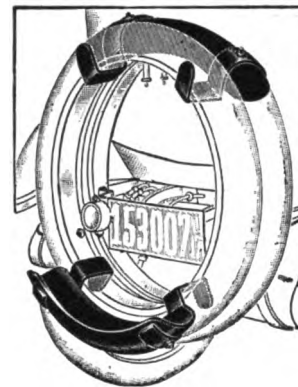
Trouble on the road has convinced most motorists of the necessity of 2-R-3 spares. The motorist who only carries one is skating on the thin ice of the river of trouble, grief, annoyance and delay.

Our attractive and convincing display stand calls the motorist's attention to his need. The simplicity of attaching 2-R-3 Tire Carriers holds an appeal that makes easy sales.

2-R-3 Tire Carriers simply hook on the preceding tire. No tools required to attach. No bolts or nuts to bother with.

Made in two models, S and Y, for all sizes of tires. Prices range from \$2.50 to \$7.00.

If your jobber cannot supply you, write us direct.



Model S

International Stamping Company 400 North Leavitt Street **Chicago, Illinois**



KESTER
WIRE SOLDER

always flows evenly

Onto the soldering surface it flows—quickly—smoothly—EVENLY. So evenly that it's the one big reason why expert solderers and solderers who are novices use KESTER—and like it!

Get acquainted with KESTER
ACID CORE WIRE SOLDER—now.

CHICAGO SOLDER CO.

4210 Wrightwood Ave.

Chicago, Ill.

—FREE SAMPLE COUPON—

CHICAGO SOLDER CO.
4210 Wrightwood Ave., Chicago.

Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder.

Name
Company
Address
City State
Our Supply House is

Am. Garage 10-22



One Coil for Every Car

With one Master Coil, three bases, three adapters, two resistances and one condenser to start with you are in the same position to handle **every** car that comes to your door as the station with hundreds of dollars invested—and this complete outfit costs but \$7.95.

When you have equipped a car you pocket a real profit and refill your stock by ordering the parts you used.

No electrical knowledge is needed and there is no chance for error because with each service station outfit are photographic illustrations showing exactly how each installation is made and a list of the fittings that go on each car and model from 1912 to 1922.

With twenty-seven years' experience back of every unit, the J & B Master Coil will positively make **better** ignition on every car equipped. You can't go wrong because we sell it on a guarantee of your money back without question if for any reason you are not satisfied.

H. P. MANLY

Distributor

1010 S. Michigan Ave.

Chicago, Ill.

H. P. Manly,
1010 S. Michigan Ave., Chicago, Ill.

Ship by parcel post one J & B Service Station Outfit including one coil and fittings to make installation on any car. Enclosed find \$7.95—Make shipment C. O. D. (Mark plan preferred)

Name

Address

Town



The Facts Are All in Favor of NOKORODE

UTILITY:—

Nokorode will quickly, easily and permanently solder all metals but aluminum.

QUALITY:—

Nokorode is carefully compounded—contains no acid. Its quality never fluctuates.

EFFICIENCY:—

Nokorode works fast and effectively, and results are everlasting.

ECONOMY:—

Nokorode is ready for instant use. Spreads further and more uniformly than any other flux, and does away with all mixing—saves both flux and time.

SAFETY:—

Nokorode is harmless—if spilled on the operators' hands or clothing it will not burn—has no disagreeable fumes.

Every can sold under our guarantee of satisfaction, or we will refund direct the full resale price.

THESE FACTS HAVE MADE
NOKORODE PRODUCTS THE MOST
EXTENSIVELY USED SOLDERING
FLUX IN THE WORLD.

THE M. W. DUNTON CO.

670 Eddy St.

Providence, R. I.



6 ft. 2 ins.

A Big Business Booster

Boy and Slate
SIGNS
Make
SALES
and
SMILES

Here is over six feet of the greatest attention-getting, sales-making, fun-producing novelty ever offered any dealer in any line. This Boy and Slate Sign, on account of its great size, its five attractive colors and interesting sayings is making a hit with the public and producing sales for the dealer wherever it is displayed.

The unusual feature of this sign, outside of its size and "make-up" is the clever, witty sayings that are chalked on the slate. We furnish you enough of these sayings to last a whole year, changing them every other day. People stop, look and read these sayings and then come back for more. In the meantime you are getting the benefit of this publicity; you are making new friends for your business, and results are sure to follow.

The sign is over six feet tall, cut out to make it look natural. It is supported by frame work so that you can set it upon the curb or wherever it will attract the most attention.

There is nothing like this sign; nothing that will make you and your business so much talked of and thought about; nothing that will so help to make sales.

Send Today for Our Offer

Write for this sign and for particulars about our scientifically refined En-ar-co products, the satisfaction builders. Get our extremely liberal dealer proposition. We make En-ar-co Motor Oils, En-ar-co Gear Compound, White Rose Gasoline and National Light Oil (kerosene) which are the highest type of scientifically refined Petroleum Products. Send the coupon in today.

THE NATIONAL REFINING CO.

National Headquarters, S-731 National Bldg., Cleveland, O.
4 Modern Refineries—96 Branch Offices

THE NATIONAL REFINING COMPANY

S-731 National Building, Cleveland, Ohio

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name.....

Address.....

City.....State.....

I now selloil



What Ho! Mr. Dealer— Look Who's Here—

ready to "trundle" in a load of profits for you—if you'll let him. Who? Speed-Dee—that creamy hand cleanser—in his new collapsible container. All your "folks" will want a tube—and then some—to carry along in the car's side pocket for quick no-water washups along the road.

We have a peach of an introductory offer for you. Other live-wire dealers who have taken advantage of it are "going strong." Quick! Get the details—and the sample that's ready for you. It's your ticket to **BIG SALES.**

STATES CHEMICAL CO.
680 West Austin Avenue
Chicago, Illinois

**Handy Size
Tube**

15¢



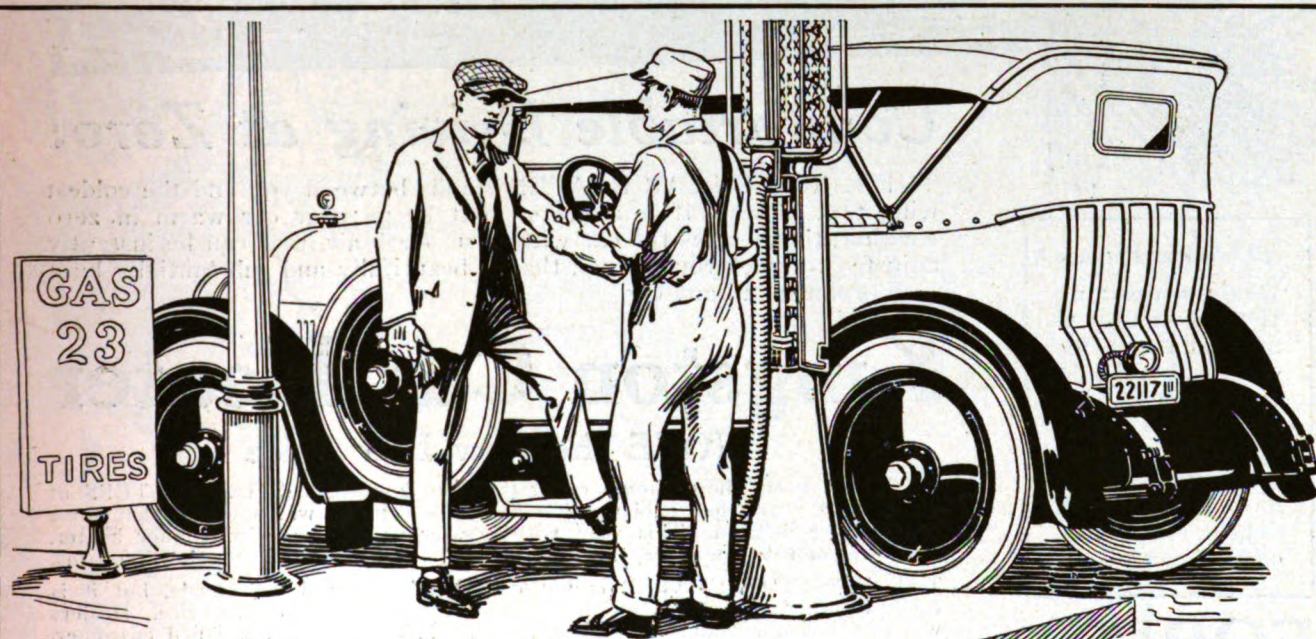
Sale of tube means sale of 27 oz. can for garage and 25 lb. pail for the home. Cases of 3 doz. tubes — \$3.60. Retail \$5.40. 50% profit. Even more profit for you on introductory offer.

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

NOVEMBER, 1922

Vol. 13—No. 11,
10 Cents the Copy
\$1.00 Per Year.



“Got Plenty of Patches for Your 5 Minute Vulcanizer?”

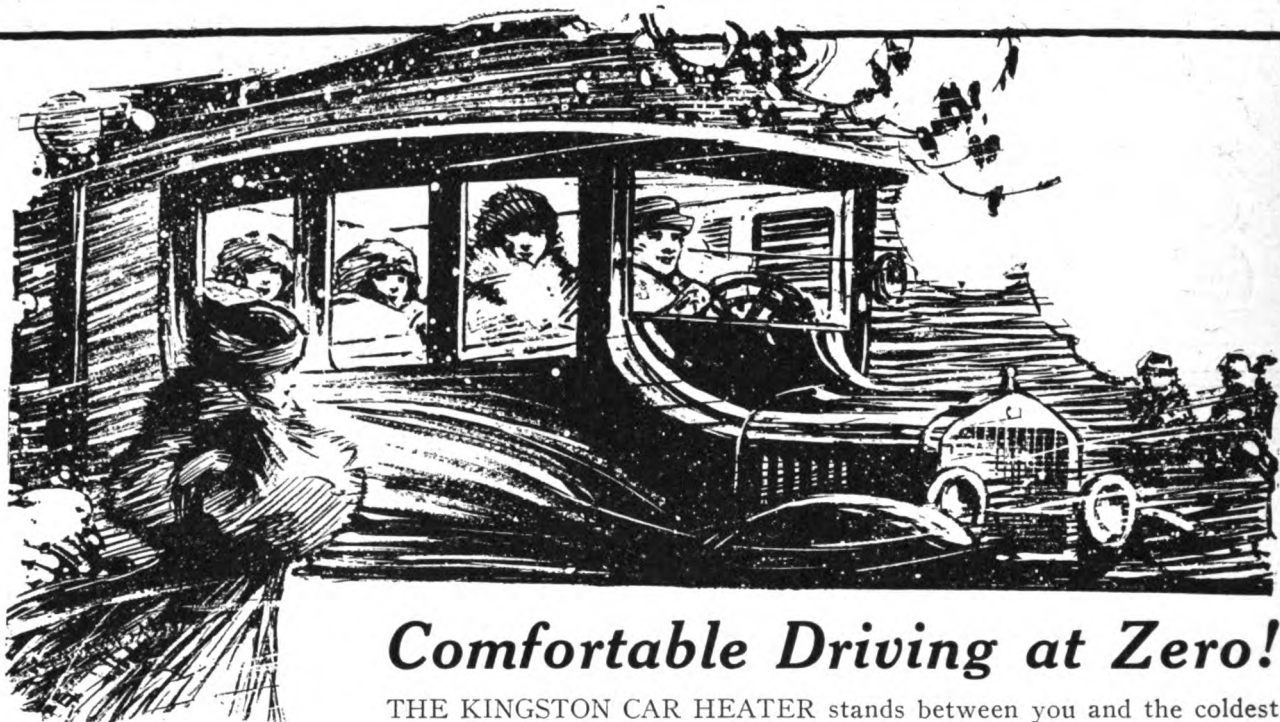
IT'S AN EASY QUESTION to ask while you are selling gas or changing a tire or loaning a pair of pliers. It's the easiest way to "ask 'em to buy." If the driver has a **Shaler 5-Minute Vulcanizer** he is likely to be almost out of patches to use with it and he will welcome the suggestion. If he is one of the few who doesn't have a vulcanizer, he'll say so and give you the easiest kind of an opportunity to make a sale.

Without doubt this is one of the most popular accessories on the market today. Of course **you** know that anyone can use it to make permanent tube repairs on the road in five minutes. You know how pleased you were the first time you used one and saw it **vulcanize** as quickly as you could stick on a temporary patch. Pass your experience along to your customers, especially the tourists, and cash in on the sales of patches that always follow the sales of vulcanizers.

Window Display Material—FREE on Request

We will supply dealers with attractive window display cutouts and posters, attractive counter display cutouts and circulars FREE on request.

C. A. SHALER COMPANY, 360 Fourth Street, WAUPUN, WISCONSIN



A Christmas Package

Dealers desiring Heaters in Christmas packages for gift trade should write or wire. No extra charge. Christmas wrappings may be removed when desired, leaving original carton.

FORD

Model Complete

\$3⁷⁵

Chevrolet
Overland

Dodge

\$5⁰⁰

Comfortable Driving at Zero!

THE KINGSTON CAR HEATER stands between you and the coldest wind that blows. It is a heater that keeps your car warm in zero weather, that warms the car with pure, fresh air, that can be instantly adjusted to meet your wants, that is beautifully and substantially built—an ornament to any car.

Kingston Car Heater

NOTE the New Low Price

DEALERS everywhere should order their stock of KINGSTON HEATERS at once. Last year when cold weather came the demand was so great that some orders were delayed. This year, with greater production, with a finer heater, and with the new low price, the sales of Kingston Heaters will break all records.

THE KINGSTON HEATER is not only handsome and well made, but it is easily installed, and complete instructions are packed with each device. Dealers will find it a quick and easy seller, insuring in every case a satisfied customer.



IMPORTANT TO THE DEALER

We are going to give the dealer full co-operation in his individual territory on the sale of the Heater. Order at once, so that we may circularize your trade. The Kingston Heater should be your best selling accessory this Fall and Winter. Write or wire today.

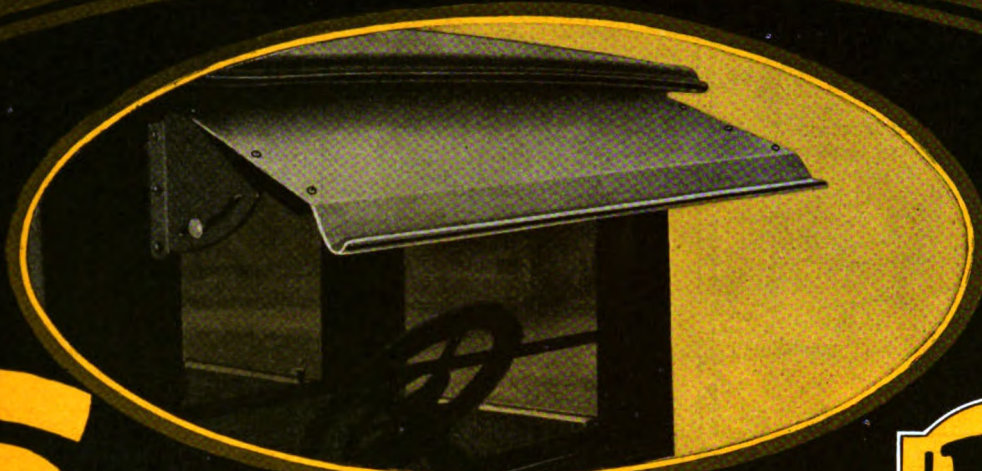
THE KOKOMO ELECTRIC COMPANY KOKOMO, INDIANA

BRANCHES

BOSTON, 15 Jersey St.
CHICAGO, 1430 Michigan Ave.

DETROIT, 4610 Woodward Ave.
SAN FRANCISCO, 1235 Van Ness Ave.

KINGSTON



5 Reasons for Good Service

\$10

Made of Aluminum *Light in Weight*
Absolutely Rust Proof

No Glass to Break....

No Reflection.....

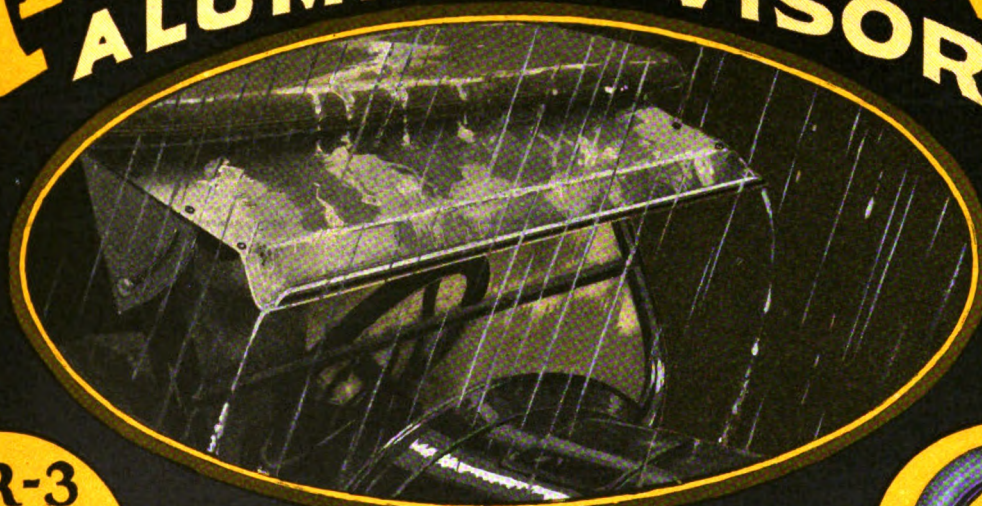
No Fabric to Tear..

Gutter Carries off Rain

*Ask Us
to Show
You One*

RAIN-R-SHINE

ALUMINUM VISOR



2-R-3
SPARE
TIRE CARRIERS
Fits Any Tire
Any Car

EVERY DESIRABLE FEATURE
IN ONE VISOR

INTERNATIONAL STAMPING COMPANY
 402 N. LEAVITT ST. MANUFACTURERS CHICAGO, U.S.A.



Costly and Bulky Equipment Is Not Necessary

Garages, repairmen and service-stations need not burden themselves with costly and cumbersome testing instruments and rectifiers. The STERLING line is designed to dispense with unnecessary bulk and its attending extra cost by making each device as simple, light-weight and accurate as possible. Not only are they labor-savers but each device assures the operator that the job he is working on will be done right, with every guarantee of satisfaction.

The Portable Sterling Rectifier



Where an occasional battery is to be charged, this lightweight 8 lb. rectifier is just the thing. Handy as an electric iron. Takes but a few hours' time to charge battery on any 110 to 120 volt A. C. circuit. Cannot overcharge as tapering down of charge prevents injury to plates. Made in 6 volt and 12 volt capacities. List price\$16.00

The Satisfaction of Knowing You're Right

Know you're absolutely right before you go ahead. Let your testing instruments put you on the right track to begin with. STERLING TESTING INSTRUMENTS diagnose troubles for you instantaneously. Years of specialized manufacture, close acquaintanceship with the service station's and garageman's problems, plus unusual manufacturing facilities all lend advancement to STERLING'S quality of workmanship.

MAGNETO METER

Invaluable for testing Ford Magneto. But a moment's work to tell condition of magneto. Registers voltage from 0 to 30 volts as well as indicating "low," "fair," "good," or "high" to interpret necessity of overhauling or correction.



List price, \$8.50

HIGH RATE CELL TESTER

The indispensable "trouble shooter" for testing any storage battery cells without removing battery from car. Mechanically and electrically correct; low initial cost; no upkeep. List price\$8.00



THE STERLING MFG. CO. 2835 Prospect Ave. Cleveland, Ohio

Sterling

Testing Instruments

Other Sterling Products

Dash and Pocket Ammeters and Voltmeters, Small Switchboard Meters, Polarity Indicators, Spring Oilers, and Radio Equipment.

Over 2½ Million STERLING Devices in Use Today

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

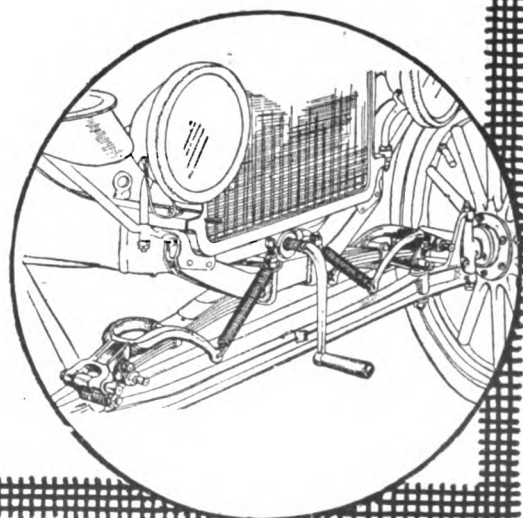
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd
London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.




Not Chance— but Good Sign Building

LOOK down the street and consider the signs.

Some stand out from the rest, not because of their size or their coloring, but because they have a certain distinction which is lacking in the others.

It is largely a matter of design—design combined with advertising thought, superior construction, the right combination of certain decorative features and illumination. It is not chance at all, but the proper application of the sign builder's art.

For more than ten years, the Flexlume organization has been trained to put selling power into electric signs. And back of all this is the largest plant in the world devoted exclusively to the making of electric signs, and a service organization which is more than nation-wide.

*Let us send you a sketch showing a Flexlume
for your business.*

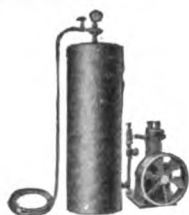
FLEXLUME CORPORATION

25 Kail St. Buffalo, N. Y.

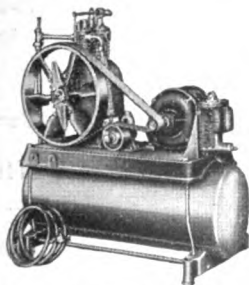


CURTIS
AIR COMPRESSORS—HOISTS—TROLLEYS—CRANES
ST. LOUIS

Established 1854



**Style "S"
Single-Stage Outfit**
Belted only—five sizes, $\frac{1}{4}$ to 3 h. p. complete, less driving power.



**Style "V"
Two-Stage Outfit**
Sizes $\frac{1}{4}$ to 2 h. p. Furnished with automatic starter. A. C. or D. C. motor.

"An Original Design"

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American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, *Editor*

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AMERICAN GARAGE & AUTO DEALER, Inc.

116 South Michigan Avenue, CHICAGO

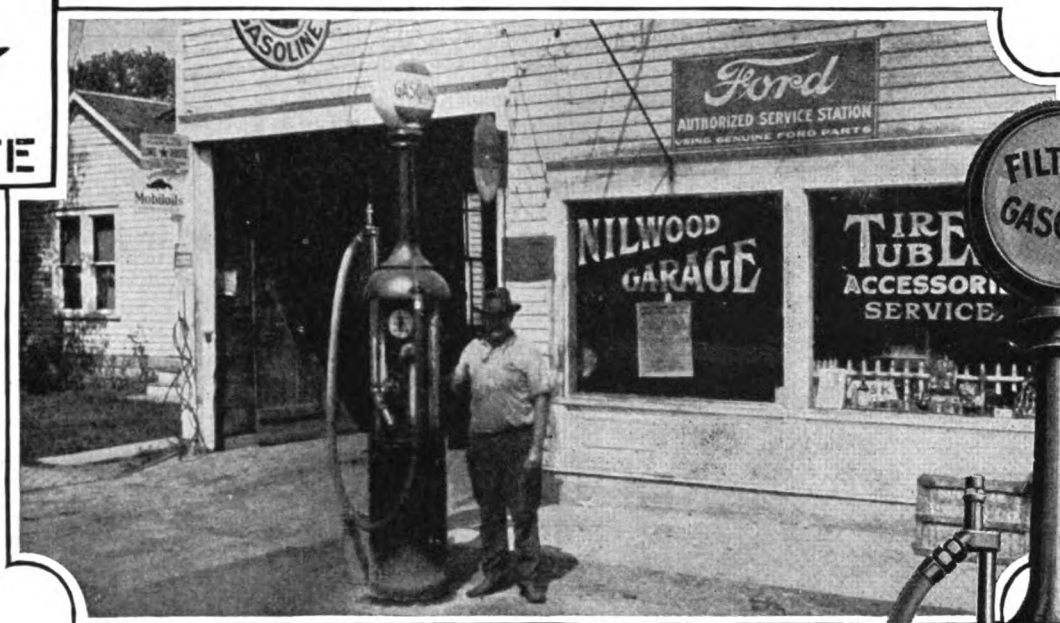
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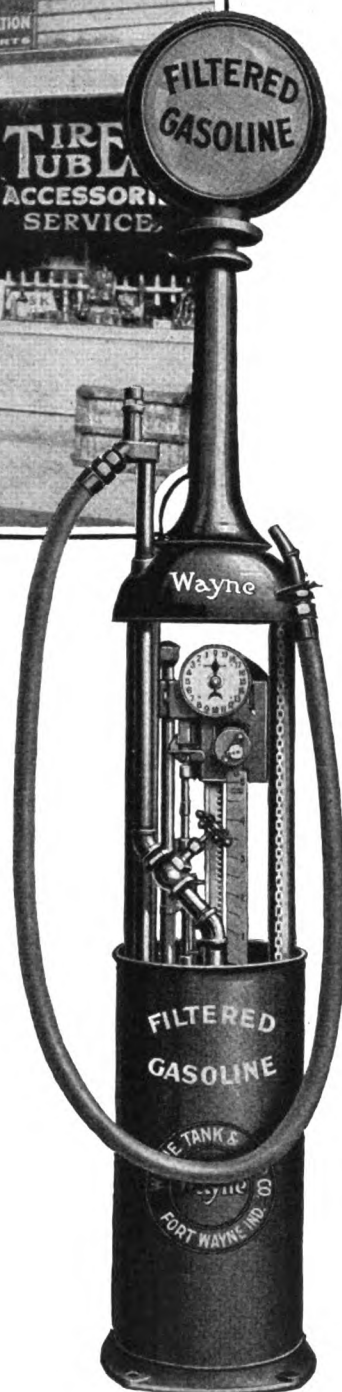
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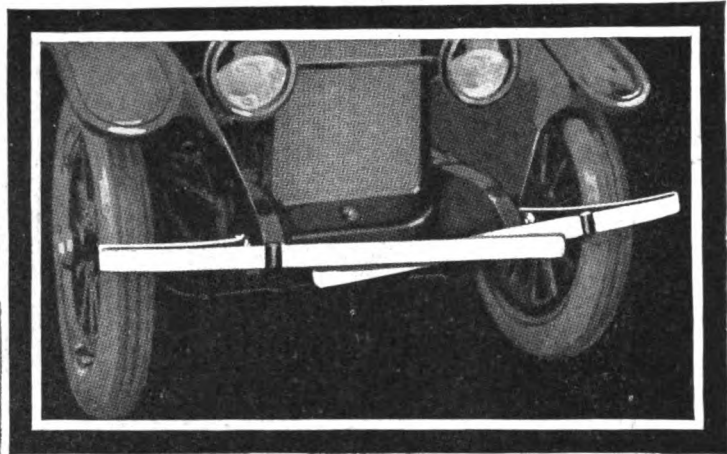
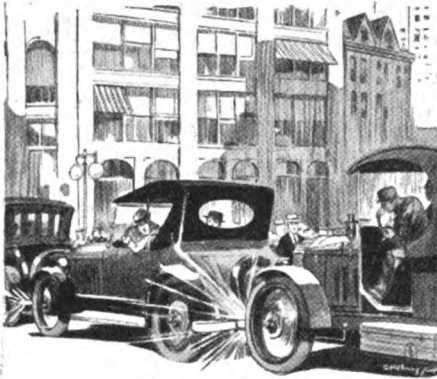
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American Garage & Auto Dealer

*A Business Paper Exclusively for the "Small-Town"
Automotive Trade*

Vol. XIII. No. 11.

CHICAGO

NOVEMBER, 1922

Putting Balance on Right Side of Sheet

Here's How One Man Did It—By Refusing Used Cars at a High Figure on a Trade-In Proposition and Placing Year's Business on as Near a Cash Basis as Was Possible, Allowing No More Than Exactly 30 Days' Credit

By K. H. Lansing

Howard K. Moses, proprietor of the Turk's Head Garage, of West Chester, the county seat of Chester county, Pa., is a bold man. This is why: He has dared to lose money in fighting for a principle which, if followed out by the entire automobile trade of the country, as he has adhered to it, would doubtless prove of general benefit.

And although Moses lost money and a few customers at first, he has won his battle and his business is better off since the tide turned. Not only that, but he has more respect for himself, greater faith in his salesmen's abilities, feels that his customers have learned something valuable and knows that he has established a good precedent in his community.

Here, in brief, is what Moses has done: He has refused to accept used cars at a high figure on a trade-in proposition; and he has placed his year's business on as near a cash basis as possible, starting positively no new accounts and allowing no more than exactly 30 days' credit to those to whom he has been extending credit.

Took some nerve to do this, didn't it? Yes; but in Moses' own words, he feels that what he lost by this change in policy was "mainly poor business, and now the balance is on the right side of the sheet."

Moses, originally proprietor of a general store and later of a creamery as well, has the biggest garage and the largest garage business in West Chester. The first four years that he was in the business in a smaller building, since disposed of, he sold more than 1,000 motor cars.

Two years ago he put up a hand-

ment, parts and tire departments. These properties, irrespective of their contents, are valued at approximately \$80,000.

Next door, across a narrow way, is the famous Turk's Head Inn, a large hotel, also owned by Mr. Moses, which helps to bring in considerable tourist motoring trade. In addition, Moses leases a ground floor office in this hotel as the local starting point of three motor bus lines.

Moses does both a retail and a jobbing business in Packard, Maxwell and Chalmers cars, and the trucks that go with the franchise of the two former; he also does a jobbing business in a few such items as fan belts, crankshafts, piston rings and the like, in addition to selling them at retail. This just by way of introducing Mr. Moses.

In about 1920, after Moses had dropped much money — about \$5,000 — through extending credit

and taking in trade from customers at a high figure automobiles in various stages of disintegration, he decided that he would either have to alter his policy, or go out of the business. Ac-



Turk's Head Garage, Said to Be Largest and Handsomest Garage in West Chester, County Seat of West Chester County, Pa.

some two-story red brick and concrete garage, sales and service building and a few months ago he added a one-story structure to match, which now houses his car sales, automotive equip-

cordingly he called a halt and ordered retrenchment.

Although when he started in the automobile business, he had persistently circularized prospects and customers, written them personal letters and followed them up in the usual way through calls, he determined to drop all this sort of thing for the time being and watch its effect. In other words, he made no effort, outside of his salesroom, to sell a single car, confining his own energies and those of his salesman along this particular line to the "stop-ins," who came of their own accord.

Of course, the general garage storage and repair business was being carried on actively during this time. For a year and a half Moses stuck to this policy. Then, last spring, he decided to revive his car sales business, but on a different plan, after having given it the "starvation cure."

He determined that the day of the "trade-in" at a high price to please the customer was over for good, so far as he was concerned, and that thereafter he would pick only the best deals and make it plain to the customer who was "shopping around" to sell his old car as much as to buy a new one, that the Turk's Head Garage was no market for that sort of thing.

If this attitude killed the sale of a new car for the agency, very well; better to have this happen than to be forced out of business by having a lot of old cars on hand that could be sold, if at all, only at a loss. Many an automobile dealer has come to this conclusion, but few have followed it out so assiduously as Moses.

And now for the credit-stretchers: Moses was also after them. On April 1—although he wasn't fooling—he issued to every customer on his books an attractively printed announcement, sending it under a two-cent stamp to insure its being read. This announcement read as follows:

NOTICE.

After April 1, 1922, our business will be run on a CASH BASIS as near as it is possible. *We will start no new accounts.* Those with whom we

are now doing a credit business will be continued only so long as payments are made promptly. To these we will render bills at the end of each month. If payment is not made within 30 days, further credit will be stopped, and we will proceed to collect without further notice. *Under no circumstances will credit be extended for a longer time.*

We are trying to give the most for the dollar, and to do so, we cannot afford bad accounts. We feel that it is not fair to those who pay cash to have to charge them a higher price in order to make up for those who do not pay at all, or those who make us wait a long time for their payments. We are adjusting our prices to a lower level, not allowing for losses through bad debts, and therefore must adhere strictly to the above.

All on our books are receiving this notice.

We want to thank you for your patronage in the past and hope that we have the pleasure of serving you in the future. And we hope that you will see, as we do, that the above policy is for your benefit as well as ours.

TURK'S HEAD GARAGE,
Howard K. Moses, Proprietor.
West Chester, Pa.

This policy has worked out so well, that comparatively few customers already on the books have been lost and energies, thrown into directions other than trying to make bad debtors pay, have obtained many new customers who are prompt pay.

"I suppose," says Moses, "that I

He adds that business is improving in all departments.

When he was in the general store business, Moses started his creamery in the belief that it would prove a "feeder" to the establishment, bringing in customers.

He was right in this conjecture; and when he later entered the garage and automobile sales business, he had somewhere in the back of his head the persistent idea that the accessories and parts trade, when once he should launch into it, would prove the bigger end of the business and that the garage and motor car sales business would become a "feeder" thereto, just as the creamery had "fed" his general store business.

He was right also in this surmise. Six months ago he put in a stock of \$10,000 in automotive equipment and parts and this business has developed so rapidly that it has passed the car sales end. If it continues another six months, Moses will place the business on a profit-sharing basis with his ten employees.

About four months ago, or two months after the automotive equipment and parts department was started, the sales in this end amounted to about \$30 a day; but now the average day's sales figure here is \$80 a day and business is on the rise. Pretty good for six months' work! Moses plans to greatly increase the accessory stock and business in the near future.

The salesroom, which is 50 by 80 feet and finished in light colors, white predominating, is the handsomest in West Chester. New sample cars are exhibited on one side of the room and a automotive equipment on the other. These units are shown in numerous glass display cases and in carefully arranged bins and shelves behind a commodious counter. In the auto-

tive equipment and parts section there is one salesman.

Directly in the rear and well out of sight are the rough bins, arranged in orderly sections, containing car and truck parts; the stock of Kelly-Springfield and Goodyear tires—about \$5,000 worth; and the tire and tube repair-



One of Automotive Equipment Counters in Sales Building of Turk's Head Garage.

could have sold a good many more cars than I have, on the 'trade-in' plan where I would have had to pay a high figure for the old car, and perhaps be stuck with it for a long time; but I would rather do business the present way. And if I were starting anew, it would be on a strictly cash basis."

ing department. The tires are placed upright on long, low, parallel racks close to the wall in the passageway leading from the automotive equipment counter to the tire repair department.

"There are no better salesmen than good displays in showcases, on shelves in plain sight and in show windows," asserts Moses, who very evidently practices his belief in the potency of these merchandising factors.

Moses was much impressed by the "Ask 'em to Buy" campaign and heartily entered it. "To 'ask 'em to buy," says he, "the dealer must have something to sell, so we are particular to have the best and to show it to the best advantage."

This is considered especially necessary as under the new policy, nine out of every ten sales made here are to persons who enter the store, or who drive to the curb for gasoline, oil, water or air; not to those in outlying points.

With his window displays Moses takes great pains. When he installed a new method hydraulic gasoline system at the curb, through a large oil refining concern, he had a notable display in his windows, among them a miniature oil field with wells in operation in a most natural manner and there were pyramids of cans and a can of continuously running oil received through a funnel in one window.

On this occasion the garage made a two-day holiday of the event—Friday, September 15, and Saturday the 16th—and advertised in the newspapers that they would give away a one-gallon can of the oil at half the regular price, or 55 cents a gallon with each five or more gallons of gasoline purchased.

By clipping the coupon from the newspaper advertisement and presenting it, the customer became entitled to the foregoing privilege.

The public is accustomed to look for the Turk's Head Garage advertisements which appear at least weekly in the local press, but the response to this one proved unprecedented. The house sold through this display no less than 400 extra gallons of oil during the week, and 150 extra gallons on those two days when the public was invited to inspect the new system and bring along the coupons.

It was recently, when the automotive equipment and parts department had shown itself to be the bigger end

of the business at the end of six months, that Moses called his ten employees—consisting of a car salesman, the accessories and parts salesman, four mechanics, two floor men, a washer and a painter—together and made a little address.

He told them that "an animal"—meaning the new department—had

WHAT MOSES DOES.

Conducts general garage car storage business.

Sells three makes of passenger cars and two makes of trucks.

Is agent for two brands of tires.

Is doing a fine accessory business.

Has a notably comfortable women's waiting room, completely furnished, in his garage.

Has a paint and trim shop, as well as a repair department.

Sold 1,000 cars in the first four years.

Has sold 67 this spring and summer.

Has two handsome new buildings—one erected within the last few months.

Plans big increase in automotive equipment trade.

Owens large hotel next to the garage, through which he obtains tourist trade.

been born recently and lived along for six months, showing signs of becoming husky; and that if it succeeded in doing as well until the end of the following six months, there would be 100 shares of profit to be divided, and each employee would be given at least one share.

The news, of course, was enthusiastically received, and it has been evident since then that a greater interest in sales has been aroused, and work and endeavor stimulated.

Sample stock cars in the salesroom and in reserve storage here now are valued at about \$15,000. One car salesman, in addition to Moses, has been sufficient under the new policy, and this plan will prevail for the time being.

Last spring and summer the house sold 67 motor cars and has many more prospects with whom it expects soon to close.

The garage has storage capacity for 150 cars and usually has at least 100 to care for. On the first floor of the older building, or garage, in which there are 14,000 square feet of floor space, is included the mechanical service and repairshop, in the rear, equipped around three sides of the room with work benches and tools. There is an overhead trolley for hoist-

ing and conveying motors, rears and other heavy objects.

On this floor also is the car washing stand with concrete floor depressed toward a drain, storage space for customers' cars, the executive office, the office of the garage superintendent and a notably fine women's waiting room, glass enclosed, furnished comfortably and having every convenience for waiting women patrons. It is 12 feet by 16 feet.

There are no elevators in the buildings, which open into each through a passageway in front passing the executive office. Instead of elevators there is a gradually sloping, broad, concrete ramp of about 100 feet in length, running to the second floor. On this floor both reserve stock and customers' cars are stored in a space of about 107 feet by 70 feet. The large paint and trim shop is on this floor, in the rear.

There are two of the hydraulic system gasoline pumps mentioned, at the curb. The lubricating oil is stored in three 280-gallon tanks beneath the concrete flooring just inside one of the front doors, the oil being piped through goose-neck faucets conveniently arranged close to a wall and out of the way. There are no portable oil tanks.

In addition to advertising in the newspapers, Moses makes a point of having both his garage and his hotel advertised, with attractive cuts, in the motorists' "blue book." In that way he calls the attention of large numbers of tourists and others to his facilities for attending to the needs of both riders and cars.

"Just now," says he, "we are going somewhat slow in our 'coming-back' process after not trying to sell cars aggressively for a full year and a half. I believe this was the right move and it was tried at the right time—when few dealers were selling cars anywhere.

"We are not going to jump into putting on more salesmen, but we are going to continue to 'ask 'em to buy' and we are going to have things and enough of them, to fill all purchasing needs of our customers. We are not going to rush into buying a lot of extra stock, but we are gradually going to accumulate enough to have a wide range of selection for our patrons. There is every sign of business picking up and the Turk's Head Garage will be ready to meet the awakened demands."

A Business Built on Promises Kept

Its Location and Appearance Are Unfavorable—Yet This Rhode Island Garage Gets More Business Than It Can Handle—Why? Mainly Because Promises Are Kept to the Letter—Old Customers Given First Consideration

By J. E. Bullard

At 290 Dyer St., in Providence, R. I., there is rather an unpromising looking building which, among other concerns, houses a garage. This particular spot would not be just the one a man would be likely to select as a good garage location. The building is not just the type one would desire for a workshop—yet that garage is doing a good business. One man who always has his garage work done there, and who passes other garages in order to reach it, was asked why he did so.

"When I take my car there," he said, "I always know exactly when I will get it back. I've tried other garages but they have not always kept their promises. When I take my car in for repairs, I want to know exactly when I can get it. I have to plan my work carefully and if I have to wait for even a half hour for that car, it costs me money."

Mr. Slick Straight, who operates this garage, has, at least in the case of that car owner, established a reputation for keeping his promises to the letter. If the car is brought in one afternoon and promised for three o'clock the following afternoon, it is always ready. In fact, unless he can get the work done in a reasonable time he does not take it. However, the old and regular customers are always cared for, if it is possible in any way to care for them. If any one must be

taking care of old customers and of always keeping promises has had a great deal to do with the success of this business. There are many other places in town with better locations, there are those with more modern and attractive buildings in which the shops are housed, but there are few repairmen who win the good-will and the trust of the customers to a greater degree than does this man.

Ten years ago, in a certain section of Long Island, there were a great many repairshops. A goodly number of these were having a hard time to make both ends meet. They did not seem to be able to build up a very profitable business. However, there was one shop that was always crowded. The man who ran this shop found it necessary to turn away business rather than to seek it.

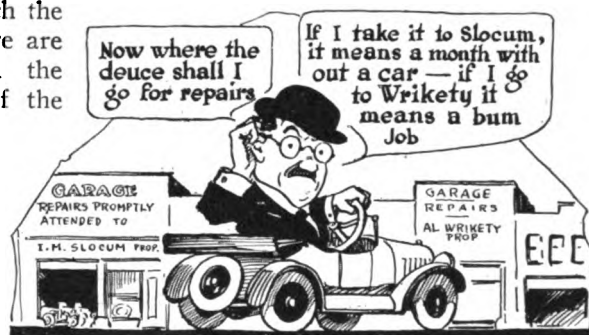
The superintendent was one of the very best automobile mechanics in that section. He had a carefully selected working force. No work was ever allowed to leave the shop until it was given a minute inspection. In other words, every job done was done right and, as a result, after a car owner had one job done there he took his car back when it needed more attention.

It certainly was a pleasure to drive a car after it came out of that repairshop. It just purred along like a brand new car, with the added advantage that one did not need to worry about wear in the parts to the same extent that he must with a new car. The

secret of the success of this plant was that it always did its work right.

Most of the other garages in that section followed this program. Enough men would be hired in the spring to

do the work that would come to the place during the summer. These men realized that the job would probably not last all the year around. For this reason they did not, as a rule, take a great deal of interest in their work.



Probably No Other Line of Business In Which Keeping of Promises and Doing Work Exactly Right is More Important.

In the fall there was a general laying off, and in the dead of winter one would find, in many of these garages, that the only person left was the man who owned the place. The next summer it was necessary to start all over again.

Now, it often happened that one summer a shop would have a man who was an exceedingly good workman on a certain make of car. By fall, a pretty good reputation would be established with the owners of that particular make of car. When the winter came and business got dull again, however, the garageman let this man go and the following summer he was not able to get him again.

Perhaps he would not be able to get a really good man at all, and all the good-will that had been created the summer before was lost because the new man was not able to do as satisfactory work as the old man. It is self-evident that these garagemen could never build up a satisfactory business in this manner. They never were sure of a working force that could do the work right. It was necessary to start the business all over again each spring.

The man who was making a success of his business kept at least the nucleus of his force all the time. If



"I Always Know Exactly When I'll Get My Car Back."

made to wait, it is the car owner who has never patronized the shop before. The interests of the old customers are considered first.

It is safe to say that this practice of

he found a good man, he kept that good man as long as he could, and he found something to keep him busy during the winter. In fact, with a good working force, it was not nearly as hard to get winter business as it would have been without this force.

He got a lot of winter overhauling to do. He got a lot of business from the doctors and the business men who used their cars the year around. These people wanted the work on their cars done right and, since this shop had the type of working force that could and did do the work right, it was not hard to get their business.

There are no two things that make a more favorable impression upon customers, or that are more effective in getting and in holding business, than keeping promises and doing the work right. If a man can't keep a shop organization that will do the work right, he is wasting his time in the automobile repair business. The sooner he gets out of it, the better it will be for him and for the automobile industry.

He can't keep a good working force, however, if he just floats along and hires men when business is good and fires them when it is bad. Under such conditions, it will be the exception when he has a really good working force. He must plan when his shop is busy to keep it busy when people are not bringing in cars in such numbers. Unless he keeps his working force as nearly intact as possible, he will never be able to give the service that results in a large and profitable business.

It is for just this reason that the shrewdest business men take full advantage of dull times and dull seasons. For many months after the business depression started in 1920, many a good business man was on the lookout for the type of men he needed in his working force. He may have discharged a good many men, but he retained those he would need most in the future and he also hired others that he would need. He was merely getting his working force into shape to take care of business when it should come.

Doing the work right does not apply merely to the repair business. In New Hampshire, in a little town where the business possibilities seem very limited, a man built up a very large dealer business by keeping all his promises and by fixing up the cars he sells so that they will seem right to the people who buy them.

This man is very quick to see just what a purchaser wants in the way of a new car. For example, he formerly sold Ford cars and was exceedingly successful in selling them and many of these cars, when they reached the purchaser, were fitted with accessories and had changes made in them which pleased the purchasers.

One man made the objection in regard to a Ford that he had to carry two spare tires in order to be sure of having the right size for both the front and the rear wheels. This dealer did not argue with him. He sold him new wheels so that all four on the car would take the same size of tire.

As a matter of fact, he usually turned any objection into larger sales. He fixed those cars up so that, from the point of view of the purchaser, they would appear just right. Of course, he was careful not to sell anything that would not give satisfactory results or make any changes that would be detrimental to the car, but he was always ready to do anything that would give the purchaser greater satisfaction.

Doing the thing right from the customer's standpoint and, at the same time, doing it right from the mechanical standpoint, always does result in

GIVE MORE THAN IS REQUIRED.

It's the work you do for which you receive no pay that earns promotion. Just as the reserve power sells a motor, or the extra stretch of sail wins a race, or the second wind makes the athlete, so the person who gives just a bit more than is actually required earns promotion. Good work may attract attention, but the reserve, the after-hour effort, not only receives recognition but deserves promotion.

No man climbs to the ladder top on an eight-hour schedule. The first man out the gate may be a good workman, but we'll wager the last man out of the gate is a better partner in the plant.

The man who gives just the amount of effort he is paid to give is overpaid. Don't lean—support. Give more than is required every day in the year and three hundred and sixty-five times you will receive more than you give.—Palmtexts.

greater revenue as well as a customer who is better satisfied. The successful repairman already mentioned got better prices for his work than did many a repairman who was not making as great a success of his business.

People seem always willing and even glad to pay for real service. They are not willing to help anyone who does not render real service, and who, in an effort to keep down expenses, allows his working force to become demoralized once a year and makes promises that he cannot keep in an effort to secure business.

There is probably no other line of business in which the keeping of all promises and the doing of all work exactly right counts for so much as it does in the automobile business.

There is a little tire repairshop located along the tourist route in New England that tourists year after year make it a point to visit whenever their tires require any attention. This shop is located in a basement. The man who runs it does all the work himself, but he keeps all his promises, and every tourist knows that any work done in that shop is done right. That little business is prosperous even if it is not large.

Robert Louis Stevenson's Address on Highways.

Robert Louis Stevenson, whose fame has become immortal as author of "Treasure Island" and other stories, showed during his lifetime a pioneer appreciation of the civilizing value of highways. In an address to the Samoan chiefs on the opening of the "Road of Gratitude," he said:

"I wish every chief in these islands would turn to, and work and build roads, and sow fields, and plant food trees, and educate his children, improve his talents—not for the love of Tusitala, but for the love of his brothers, and his children, and the whole body of generations yet unborn.

"Chiefs! On this road that you have made many feet shall follow. . . Our road is not built to last a thousand years; yet in a sense it is. When a road is once built, it is a strange thing how it collects traffic; how, every year as it goes on, more and more people are found to walk thereon, and others are raised up to repair and perpetuate it, and keep it alive; so that perhaps even this road of ours may, from reparation to reparation, continue to exist and be useful hundreds and hundreds of years after we are mingled in the dust. And it is my hope that our far-away descendants may remember and bless those who labored for them today."

Their Success Due to Business Policy

So Say the Owners of This Thriving Tennessee Garage—And This Business Policy Was Based Upon the Following Principles: Uniform Prices to All A Strictly Cash Basis, Lowest Possible Rates and Unexcelled Service

By N. N. Fowler

Down in Memphis, Tenn., the first of the present year, the garage industry evinced only the slightest interest when it was announced, rather modestly, that two young men unknown to the trade had taken a lease on a new building, eight blocks from the main business district.

Garage operators in the same block went around to meet their competitors, and when the novices told the settled business men their plans, the men who knew the game went away laughing. They told their friends in the trade, and within a few weeks, the trade was enjoying what it called a good joke.

Who ever heard of such plans for operating a garage? Some of the more settled ones shook their heads. It was "just too bad for such nice young men to waste their money in such a venture."

The novices, H. C. Parotte and W. H. Blackwell, knew the insurance business, all admitted, but the garage business was different.

But, within the space of three months, things began to look up for the "P. & B. Garage," as the new venture was called. At the time when Memphis was feeling the crisis in the financial depression, which was beginning to be felt acutely in the South, the P. & B. was turning away trade. A garage in the same block filed a voluntary petition in bankruptcy, and another garage, less than a block away, had sent overtures to Parotte and Blackwell, offering to sell out at a reasonable sum.

Parotte and Blackwell secured a lease on a modern, strictly fireproof building, with 25,000 square feet of floor space, and took over the building on January 1, 1922. When they opened for business, twenty of their friends placed their cars in the new garage. Presently business began to boom and, within four months, there wasn't even standing room at the P. & B.

Parotte and Blackwell, over a cup of coffee one evening a year ago last summer, were discussing automobiles. Both owned cars and took a keen in-

terest in them as their hobbies. "Let's open a garage!" Parotte suggested.

Both men, being of the type that acts quickly after the initial reaction, went to work with enthusiasm to plan their business policy. After a careful survey of the Memphis field, the partners decided on the following trade policy:

- 1—Uniform prices to all,
- 2—A strictly cash basis,
- 3—Lowest possible rates,
- 4—Unexcelled service.

The building has an accommodation for 175 cars which, as has been said before, is filled to capacity daily. Fifty cars are stored daily. Proceeds from the sale of gasoline, oil and washing and polishing service pay running expenses. The balance, with the exception of rent, is profit.

Monthly storage prices were fixed at \$7.50. This price also included washing of cars once a week, and delivery to the owner once daily. This delivery service, from the point of view of the patrons, is the best part of the service. Although the garage is far out of the business district, for a town the size of Memphis, Parotte and Blackwell's trade is derived mostly from car owners who live within a closer distance to two or more garages.

But, with the delivery service, the

garage service can cover a radius of several blocks. Garage attendants, who otherwise would be idle, are used to deliver cars to patrons. The remainder of their time is spent in washing, oiling and polishing cars. This is one garage in which the attendants are paid well, and in which they earn their wages.

In connection with the service policy, it may be said that it is the policy of the P. & B. managers to meet personally each patron when he delivers his car for storage, to ascertain what repairs, if any, are needed, and to inform the patron. Parotte or Blackwell meets each car owner when he comes into the garage with his car, and looks personally after the parking. This personal interest in patrons has greatly enhanced the value of the P. & B. in the minds of Memphis automobile owners.

In making their preliminary survey before opening their business, Parotte and Blackwell found that garagemen were discriminating in rates charged to various patrons. Some would secure a certain service for \$15, while others would be charged as low as \$6 for the same service. In fixing a uniform rate of \$7.50, Parotte and Blackwell had figured out costs of operation, rents, taxes and depreciation, to



P. & B. Garage, Memphis, Tenn., Accommodates 175 Cars and is Filled to Capacity Daily.

a unit. After eight months in business, they found their original figures within a hundred dollars of their first estimates!

When the partners began their campaign for customers, by personal solicitation, they found that their first estimations of non-uniform price charges were worse than they had at first thought.

A garage located within a few blocks was the first to feel the pinch

of their competition, and within two months, its policy of non-uniform rates all but wrecked its business.

When their business had been firmly established, and when what at first had been a "joke" had resolved into a serious business enterprise, garagemen began dropping in to see the young insurance men who "knew nothing about garages." Some openly asked them to "stop their rate war," while others merely hinted that it

would be a good business policy for all men in the local trade to pull together. But Parotte and Blackwell merely stated that their business was founded on firm business principles, which rival businesses were privileged to adopt.

The firm has had no trouble in collections because of its cash policy. Bad customers are kept out because there are plenty of good ones willing to step in when there is a vacancy.

Sum Pages from a Chauffeur's Dyerie

Being the Story of How I Cum to Be a Chauffeur and Sum of the Things That I've Larned About Salesmunship—How Sum Garagemen Go About It to Get Bizness frum Peepul That Think They Don't Want to Buy Ennything

By Frank Farrington

Jane, that's my wife, she got me into this heer dyerie bizness. She says she wants to reed all about where Ive bin when I and the boss and the missis goes tooring. I kno whats the matter, Sheez goin to check me up and see if I meet up with any dames she woodent stand for. She needent worry. One wife is enuf and plenty as long as theyre working this war tax game. And anyway I told Jane before I went off last time that I aint any don jew ann.

At that I gess I woodent of started no dyerie if Jane haddent told me Ide got to, becaws I remember how pa used to get out his old dyerie every Sundy and reed in it and say: "Thoze were the good old days!"

Then ma wood cum back at him: "Yes, good old days! If you'd saved a little munny then, we woodent owe everybody in town now." And pa wood say: "What you kicking about? When I married you, you diddent have a rag to your back and now youre all rags."

This job Ive got I got like this. When I got back from the place where Ide bin K. P. for a year or 2 I saw a advertisement of a chauffeur wanted for a small selected family and I applied. The boss sent me to see friend wifie. She gave me a worse question air than they give me when they joined me into the army. But I passed all rite and now, even if I call Mister Parish the boss, he aint. She is. Heez mebbly got the munny, but she says how to spend it—when she can make up her mind to part with any.

Pretty smooth the way the feller got her to buy this Purtypunk car. Heed talked to her a lot of times, but she always said they coodent afford to buy

a car. Then he got up a list of all the munny sheed save having a car. There was carfares and taxi fares and time wasted walking and sumthing for helth becaws she diddent get enuf outside air, and dockters bills and engagements the boss coodent get there to keep, and all those things he had down on a paper and he cum around and visited with her and he asked her about each thing, about how much it meant and he set down just about her figgers and then he added it all up and he said:

"You have to keep upwards of \$5,000 invested to provide income to take care of those items in your regular expenses. Did you know that an automobile would save you those expenses, and your automobile represents an investment of a cuppel of thousand dollers?"

That was right too. Of course, it costs munny to run the automobile but, at that, why ain't that good selling talk. It does save a lot of expenses to have the car and it makes that saving look bigger if you talk about it in the figgers of the amount you have to keep invested to produce that much.

I notis theres a lot of difference in the way garaje fellers handle the old girl. Just about shock absorbers for instance. The old Purtypunk was throwing us all over the lot every time we hit a ruff peece of road. I told the Missis sheed ought to have sum shock absorbers and they sounded good to her and she sed weed see how much they cost. So she had me drive her around to Pike's garaje the first time we was out. I don't like Pike's but she always goes there sumtimes.

Well, Pike cum out and he sed good day and the Misses sed: "Wood it be

very expensiv to put shock absorbers on this car Mister Pike?"

Pike, he looked at the car and he sed, "It'd probbly cost you \$90."

"Drive on, James," was all the old girl said, and Ide let the clutch in al-ready before she said it.

Now lissen, I knew Pike diddent kno how to handle her. I sed, "I think, mam, if weed go to Purdys mebbly you cood get a better deel."

Well, she had me drive around to Purdys and Purdy cum out and he knoze the Missis like a T. He said, "Good morning Missis Parish. That car looks just as classy as ever. Never gives you any trubble does it? What can we do for you this morning?"

Now Purdys got a good smile and he kind of gets you warmed up a little when he meets you. He aint glum and strickly bizness like Pike.

But the Missis was kind of gun shy on that shock absorber bizness becaws Pike had scared her out. She said: "Why, I was wondering how much it wood cost to put shock absorbers on this car. It throws me all around on a ruff peece of road. I spose it wood be pretty expensiv, woodent it?"

Purdy said, "Youll be surprised to see how cheap we can get you out of that. Theres 2 things we cood do. You need an Eezyride shock absorber on there and a set of four of 'em would probably cost you about ninety-five all put on and reddy to run, and if Ime any judge they mite save you smashing that fifty dollar bonnet of yours on the top most any day, and if they did that twice, theyd save their cost, woodent they?"

"But that's more munny than I want to put into shock absorbers, Mr.

Purdy. You said there was 2 things you cood do. What is the other?"

"Well," says Purdy, as he examined the car, "the most of the throw you get on those Purtypunks cums from the front. Now, if you was to put Eezyrides on the front and a pair of good snubbers on behind, youd get just about as good results as you wood with Eezyrides all around and it woodent cost you moren seventy dollers all together. If you wood have James bring the car around tomorrow morning erly, weed hav those all on and working good by noon. Wood that time sute you best?"

Now what dyou kno about that?

That must be sum of this soopersalesmanship or sumthing like that. The Missis cum rite thru and said for me to bring the car when he said, and when we rolled off, I cood see in the mirroscope that she was looking in her hand bag mirror to see how becumming that fifty doller lid was that Ile bet cost her four-eighty-five if it cost a cent.

Say, Ile bet not many garaje men studdys out how to get on with the wimmen like that Purdy does. He just gets em eeting out of his hand in a few minutes and he dont flirt with em eether. He just seems to kno how to make em feel rite.

The boss mite take a lesson or 2

from Purdy, but if he did Ime afraid heed be able to get the Misses to let him drive the car and that don't sute me. The boss is a good little skout all rite, and heez got sum sporting blud but I stand rite with the Missis on his driving. When I die in a reck I want to reck it myself. It wood be just like the boss to spill us all over sumbodys tin lizzie and I dont want to be kicked in the hed by a mekannical crickit.

Ile tell the world, as a driver, the boss is a dandy bank casheer. He thinks you prime the syllinders by putting water in the radiator and his idea of safety first is to zip around the turns on the rong side of the rode.

Legal Rulings of Interest to Garagemen

Michigan Supreme Court Rules That Garage Keeper's Lien Does Not Take Precedence Over Chattel Mortgage—New York Law States Garage Keeper's Lien on Automobile Depends Upon Possession—Decisions by Other Courts

By R. R. Rossing

Lien Does Not Take Precedence Over Prior Chattel Mortgage.

A garage keeper's lien, under Pub. Acts 1915, No. 312, paragraph 1, of state of Michigan, does not take precedence over a prior chattel mortgage.—Edward R. Sloat v. Mid-West Finance Corp. Supreme Court of Mich. 189 Northwestern 52.

Garage Keeper's Lien on Automobile Depends on Possession.

The right to retake possession of an automobile conditionally sold passes to the transferee of the notes given for the purchase and of the conditional sale contract, and cannot be enforced by the original seller, even though the transfer was as collateral security, and not absolute.

The lien of a garage keeper, given by New York lien law, paragraph 184, for repairs or supplies to an automobile, lawfully in possession, depends upon possession of the automobile, and a voluntary surrender to the owner prevents a forcible retaking of possession.

Within New York lien law, paragraph 184, giving a lien to garage keepers for repairs and supplies for an automobile of which they have lawful possession, the possession must be with the consent or acquiescence of the owner, so that forcibly taking possession of an automobile as agent for the holder of a conditional sale contract does not entitle the garage keeper to retain possession to enforce a lien for repairs and supplies furnished to the conditional buyer.

Where the defendant's evidence that he took possession of plaintiff's automobile as agent for the holder of a conditional sale contract on which there were overdue pay-

ments, was erroneously rejected, the New York Supreme Court held that a judgment allowing damages for the detention of the automobile from the date of taking possession must be reversed, unless the owner remits the allowance for such damages prior to making the overdue payments and demanding possession of the car.—May Desmond Rapp v. Mabbett Motor Car Co. Supreme Court of New York. 194 N. Y. Supp. 200.

Chattel Mortgage with Erroneous Number of Machine.

The record of a mortgage on a Ford automobile, model T, 1918, sedan, No. 3558516, is insufficient to put the purchaser of car No. 2558516 on inquiry into the possibility whether by some mistake the two numbers are intended to identify the same car.

A record of a chattel mortgage, which fails to show the true individual number of the mortgaged automobile, but gives a different number which it does not bear, was held by the Iowa Supreme Court as insufficient to put a purchaser on inquiry.—First Mortgage Loan Co. v. Durfee. Supreme Court of Iowa. 188 Northwestern 777.

Violation of Agreement Not to Engage in Competing Business.

Where the garage business, sold with a covenant not to engage in a similar business in or adjacent to the town, was located in a town covering a square mile of territory, through which a main north and south highway ran, it was held that the conduct of a garage at a place outside of the town, but along the main north and

south highway and less than eight-tenths of a mile from the garage sold, is adjacent to the town and its conduct was a violation of the covenant.

Where the seller of a garage business covenanted not to conduct a similar business in or adjacent to the town, except to carry on the business of his Buick agency which was reserved from the sale, the purchaser of the business could assume that a garage subsequently erected by the seller within the prohibited distance was intended only for the conduct of the Buick business, so that his failure to protest when he first learned of the intention to erect such a garage did not preclude his right to prevent the conduct therein of a general garage business.—George P. Scotton v. George D. Wright & Son. Court of Chancery of Delaware. 117 Atlantic 131.

Place for Suit on Sale Contract for Automobile.

Within the provision that a private corporation may be sued in any county where the cause of action or any part of it arose, it is held under a Texas law that the cause of action for breach of contract is made up of the contract between the parties and its breach.

A contract for the sale of an automobile at a price f. o. b. buyer's place of business, payable by draft with bill of lading attached at a designated bank in such place of business is performable by delivering the automobiles at that place of business so that, if the contract is in writing, the seller may be sued in that county, though he did not reside there.—Farmers State Bank of Donna v. Sullivan, Court of Civil Appeals of Texas. 241 Southwestern 727.



Current Comments and Observations

By The Editor

Business on Firm Foundation.

The business revival which had been foreshadowed many weeks ago by all such familiar economic weather signs as railway traffic, iron production, and volume of checks drawn on the country's banks, is now clearly enough in evidence.

The quite unanimous testimony of the weekly reviews of the mercantile agencies and monthly bulletins of the Federal Reserve banks would establish the fact even if it were not demonstrated by the report of business men on their own affairs in every-day conversation.

From these individual descriptions one is apt to get the impression that trade is fairly active, its basis sound and its expansion continuous, but that it does not yet measure up to the traditional "business boom." Naturally, this fact adds interest to the question how fast and how far the progressive movement of trade revival is likely to go. It is well to recognize that powerful factors in the business situation are tending to restrain any developments which may promise a repetition of expansion on a scale comparable to that of 1919-1920.

The lack of stable adjustment of prices of farm products to prices in general, rising wage scales and other costs of production, inadequate railway equipment, continuing uncertainties in the conditions abroad upon which our foreign trade depends, and the overtaking of demand in some lines of production in which shortage of supplies has long persisted—all combine to limit the probable range of early general expansion.

Undoubtedly it is better that this should be so. What American business wants, at this time of uncertainty in so many directions in the economic field, is to feel that its feet are on solid ground. No one of sense expects or wishes for another 1919.

It is quite generally acknowledged that it is better for all business in the long run that recovery from the depression should proceed gradually enough for the establishment of a durable basis rather than that over-reaching expansion in a few lines should further disturb the processes of orderly readjustment.

The fundamental conditions of the coun-

try are intrinsically sound and the production and movement of pig iron, steel, Portland cement and petroleum, and activity in paper, silk, wool and cotton lines all indicate that business is operating on a firm foundation.

* * * *

As Others See Us.

French and German economists have been studying the reasons for this country's prosperity, and their conclusions are interesting although well known to those who have given thought to the automotive industry.

"The number of motor cars in a country is today the measure of a people's prosperity," says the most recent issue of the Berlin Economic Monthly. "As regards the United States, this is notably true." Then statistics as to the number of persons per car beginning with 10 persons to every car in the United States to 690 to every car in Italy are presented. The countries listed in between these extremes in order are: England, France, Canada, Belgium, Denmark and Norway. Germany, Italy and Spain are listed as the worst off in business. Mexico is better off than Brazil and Argentina more prosperous than Switzerland.

This index of business standing based on number of automobiles is roughly true as to business facts.

The French economist finds that the motor car industry has been a life preserver for much middle class business that otherwise would have been wiped out by the big combinations of capitalists.

Use of gasoline has enabled many independent oil companies to spring up; rubber used in tires has brought an increase in new rubber companies. Garages have developed so that receipts for services rendered are more than half a billion dollars a year in the United States. The men doing repair work and providing supplies take a billion dollars a year. Road building companies are doing a construction business of hundreds of millions a year. Motor car drivers receive about \$650,000,000 a year.

Thus the French economist figures that the American automobile industry, outside of its great factories, has created about 4½

billion dollars' worth of independent, individual middle-class business enterprises and occupations yearly for this country alone.

So when we hear people speak lightly of the automobile, it might be well to direct their attention to possibilities that would follow in iron, steel, oil, gasoline, rubber, and the thousands of garages and repair-shops if the use of motor cars suddenly dropped to the level of their use in France, Germany, or even Great Britain.

That would be some shock to American business—and unemployment would—well, we'd all stop eating and begin counting the pennies as never before.

* * * *

Better Business.

Motor car production during October was 20 per cent in excess of September, according to an estimate made by the National Automobile Chamber of Commerce early this month. The total output of the industry, based upon statements of shipments, is estimated at 244,000 cars and trucks. The best previous October on record was in 1919, when 200,000 cars were produced.

The unusual increase in output in October, as compared with September, is credited to increased availability of coal, which was relatively scarce in the previous month. Based upon returns already in hand, it is predicted that the fall months, though reasonably less than the summer, are expected to register the best autumn trade on record.

An improvement in the movement in used cars is reported in six states.

Shortage of freight transportation is maintaining the truck market at the September level with Massachusetts, Texas, Pennsylvania and Ohio showing increases.

Despite difficulty in getting the materials for motor cars, due to the freight car shortage, production continues at a high rate and the new cars are absorbed as soon as received by the dealers.

So much for the car manufacturers. Reports of some of the large accessory manufacturers for last month indicate that it was the biggest business month in their history.

The automotive industry clearly is leading the way to better business.

How Storage Battery Is Constructed

Rapid Progress Made During Past Few Years Toward Standardization of Storage Battery Construction—A Few Sizes Will Meet Requirements of Majority of Automobiles Now Used—Table Showing Battery Box Dimensions

By S. E. Gibbs, M. E.

Superintendent of Shops, Des Moines University

Until recently, storage battery construction varied considerably among the various manufacturers of automobile batteries. Rapid progress toward standardization has been made during the last few years and within a few more years batteries will be fairly well standardized.

A casual glance at the various sizes of batteries that are manufactured by some of the smaller firms will convince one that a few sizes will meet the requirements of the majority of automobiles.

Various voltages—from 6 to 24—have been used, but most of the newer machines use either the 6 or 12-volt battery, and there are many more of the 6-volt than the latter in use.

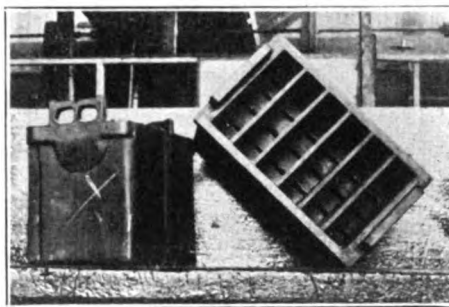
There are three prominent sizes of batteries in use, namely, the 11 and 13-plate, 6-volt and the 7-plate, 12-volt. A thin 13-plate battery has recently become prominent. This battery is about the size of the standard 11-plate battery and is usually more or less interchangeable with the 11-plate batteries. There are many 9, 15, 17 and 19-plate batteries in existence, especially on the older cars, but the 13-plate does not seem to have enough capacity in some instances, so some new cars are using the larger batteries.

There are also the special Cadillac and Packard batteries, each used in but the one car. The smaller cars generally use the 11-plate batteries, but many of the Fords use the thin 13-plate Exide type. The 13-plate standard size batteries are generally used on the medium sizes and larger fours. The most common user of the 12-volt battery is the Dodge, but the Maxwell and several others have used or are using this type battery.

The $\frac{1}{8}$ -inch thick plate seems to be the most common and is often referred to as

standard thickness. The thin plates, such as are used in the small 13-plate batteries, are $\frac{3}{32}$ -inch thick. There are various sizes in up to $\frac{1}{4}$ -inch thickness and some manufacturers use a heavier positive than negative plate.

Most of the common batteries use a



Showing Types of One-Piece Containers.

plate that is $\frac{5}{16}$ inches wide. Three heights are in common use—often designated as low, medium and high. The low plate is about $4\frac{1}{4}$ inches high and is most used in certain 6-volt and 12-volt batteries. The medium, and probably most common size, is about $4\frac{3}{4}$ inches high and is sometimes referred to as a standard size plate. The high, or $5\frac{1}{4}$ -inch plate is used in many 13 or more plate batteries, such as are used in rather large cars and in the 7-plate, 12-volt Dodge battery.

The majority of plates are connected to the strap by a lug placed at the upper corner of the plate, but many plate manufacturers use an offset lug which is placed about two inches from the corner. By turning the strap around, either type lug can be used in almost any battery.

Various assemblies are used, but the side-to-side method of placing the jars is the most common and seems to be more popular

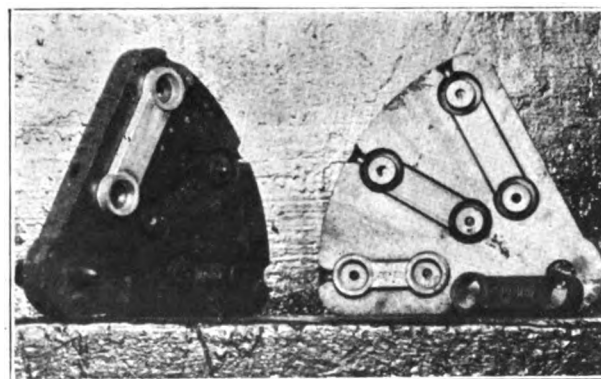
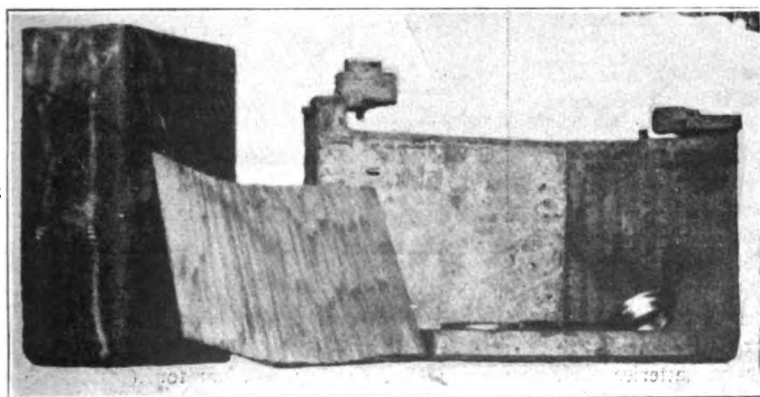
each year. The end-to-end assembly was used on several prominent cars a few years ago, but is, in most instances, replaced by the side-to-side assembly at present. There are several special methods of assembling which are, in the most part, used upon but one or two types of cars which must be reckoned with in the average service station.

There are two general types of battery boxes or containers in common use at the present time; namely, the wooden box and the rubber or composition container. The wooden box has been in almost exclusive use in the automobile type battery for many years. Various woods have been used for battery boxes, but oak, maple, birch, ash and cypress are the most popular among the manufacturers.

Probably the oak box is in most common use and the maple second. The corners of the boxes are usually of the interlocking type and are glued with acid-proof glue and doweled. The bottom is usually made of two pieces, the ends of which are fitted into a groove in the end of the box and fastened to the sides by means of screws. The joint in the center of the bottom takes care of expansion, and holes are often drilled to allow acid which might reach the box to drain out.

Boxes should be true to standard dimensions and be square and solid. A poor box may cause the jars to be broken and cost many times the difference in cost of a good and a poorly constructed box. A good grade of acid-proof paint should be used when painting the boxes and may be applied with a brush when but a few are to be painted, but an air brush or dipping process will save much time if enough boxes are to be painted at one time to justify the installation of such equipment.

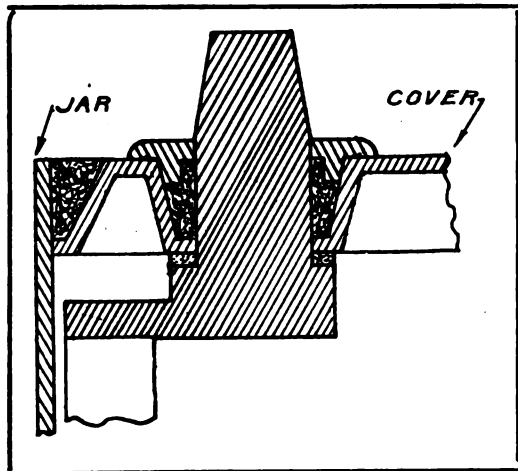
The dipping process is simple and re-



At Left, A Jar; Group of Positive Plates (Dark); Group of Negative Plates (Light); Separator; Uni-Seal Cover; and Sealing Ring. At Right, 7, 11 and 13-Plate Connections and Mold in Which They Were Made.

quires only a vat large enough to dip the box under the paint. It often requires an excessive amount of paint and produces a more or less rough job, especially if the paint is not thin and the work is not done in a rather warm room.

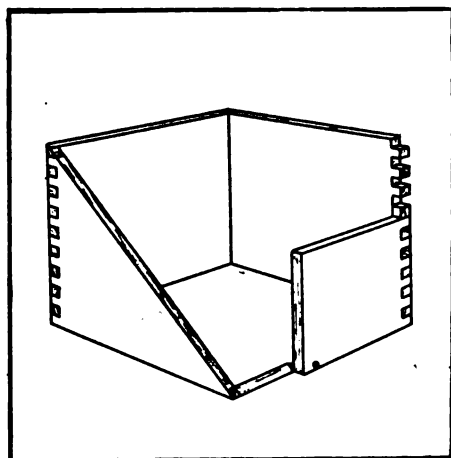
The air brush method is fast and does nice work, but the outfit is rather expensive when only a few boxes are to be painted. Many battery men prefer to have



The Uni-Seal or Well Type of Cover.

only the outside of the boxes painted, as it allows the sealing compound to come into direct contact with the wood. The excess sealing compound is usually scraped from the top edge of the box and then the edge is painted after the sealing is completed.

Both wire and pressed steel handles are in common use. They should be lead coated so that they will not be damaged by the acid which will often reach them. The wire handles are placed in holes in the top edge of the ends of the boxes, and are held in place by slugs of lead, which are poured around the ends of the handles



Wooden Box in Almost Exclusive Use in Automobile Type Batteries.

from holes in the sides of the end section of the box after they are in place.

Many of the larger stations buy their boxes unpainted and with handles loose, thus getting a lower price and supplying a profitable job for spare moments or dull

times. The pressed handles are usually fastened to the boxes by means of screws and are usually put on the boxes at the factory.

The hard rubber or composition battery container is more or less new but has become very popular within the last few years. No jars are used with this type of container, as it is divided into compartments by partitions, so one container replaces the wooden box and jars. The advantages claimed for the one-piece containers are:

That they have strength; are true to dimensions even after long usage; are unbreakable; are acid-proof and frost-proof; are non-conductors; are leak-proof, and have an attractive appearance and long life. They cost but little more than a good wooden box and jars, require no paint and the battery is easily assembled.

When assembling a battery with a wooden box and rubber or celluloid jars, the jars are sometimes placed in a box that is a tight fit. Sometimes a slightly longer box is used and wooden spacers are placed between the jars. At present it is common practice to set the jars in the

- 2 11-plate, low.
- 45 11-plate, medium.
- 10 13-plate, medium.
- 3 13-plate, medium long.
- 2 15-plate, medium.
- 10 7-plate, medium.
- 10 11-plate, high.
- 10 13-plate, high.
- 5 7-plate, high.
- 3 7-plate, Maxwell special.

A Balanced Stock of 100 Boxes.

box more or less loosely, but the bottom of the box is often coated with a layer of hot sealing compound and the jars are forced down snugly, thus forcing the compound up and around the bottoms of the jars.

Some battery men claim that, by setting the jars in the compound, the battery becomes more of a compact mass and less liable to breakage or damage. However, this method requires more time to assemble and also makes dissembling rather difficult, as it is hard to get the jars out of the box.

Jars are usually made of hard rubber, but celluloid has been used by some manufacturers. The jars are about $\frac{1}{8}$ -inch thick and have several stiff ribs extending upward in the bottom to serve as a support for the plates and also as a means of keeping the plates well off the bottom, so they will not be short-circuited by sediment which collects in the bottom of the jars.

The jar covers on batteries such as are used in automobiles are usually made of hard rubber. Many types of covers are in

common usage, as many of the leading manufacturers have developed a type of cover which they have patented and use exclusively on their batteries. The Uni-Seal or well type of cover and the gasket seal covers are used extensively for repaired or rebuilt batteries and also by many of the smaller manufacturers.

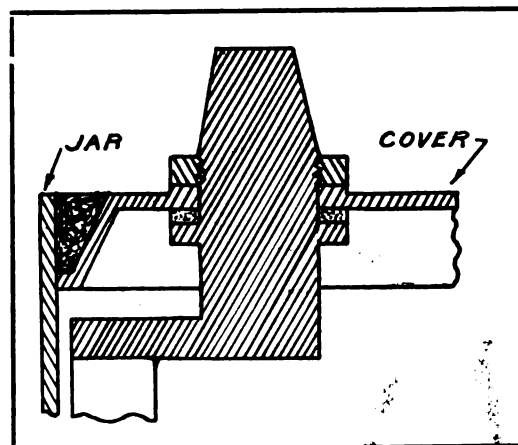
The well type cover gets its name from a well or cavity into which hot sealing compound is poured around the post. A lead sealing ring is placed over the well and pressed down tightly onto the tapered post, thus forming a solid joint. The gasket type cover is very simple, as its sealing arrangement consists of a threaded post and nut which compress a rubber gasket tightly against the bottom of the cover.

The covers are usually set down against a shoulder on the posts or the strap, and are held in place and made acid tight by means of sealing compound, which is melted and poured around the cover and allowed to set.

This sealing compound is usually made of gum asphaltum and other substances, such as resin and paraffin wax. It should be sticky enough not to loosen or break in cold weather, but should not become sticky or too soft during warm weather. Most compounds can be softened with a little automobile oil if they become too hard.

Plates are set into the jars or compartments so that all the lugs on the positive plates are at one edge and all those on the negative plates are at the other side. Each group of lugs is burned or welded to a strap, which is usually cast at the bottom of the posts.

Thus all the positive plates of each cell are connected to one of the two posts, which passes through the covers, and all the negative plates to the other post. There is always one more negative plate than positive plates in a cell, as it has been found most practical to place a negative plate on



The Gasket Seal Type of Cover.

each side of each positive plate in the cells.

Separators are placed between each two plates, so they will not touch and become short-circuited. Separators, such as are in common usage, are made of celluloid or

What Shall We Do With the Used Car?

How Can the Dealer Make a Good Merchandising Proposition of the Used Car?—Answer Is, "With Shop Equipment and Someone to Use It"—Used Car Properly Rebuilt and Repainted Easily Sold at Fair Percentage of Profit

By J. N. Bagley

Not long ago, I happened to be in a car dealer's place when a prospective customer came in for a new car. The dealer stepped around and showed the customer the good points claimed for his car and quoted the prospect the prices of the different models.

"What will you allow me for my old car?" inquired the prospect, as he showed interest in one of the new cars the dealer was selling.

"Give? The devil!" snapped the dealer. "My place is half full of used cars now and I can't get rid of them. I can't take your used car." With this, he turned on his heel and lost interest in his new prospect immediately.

The prospective customer looked at the dealer for a minute, but said nothing and left the place at once. When the man had gone, the dealer remarked that he wished every dealer in the country would flatly refuse to consider the used car in exchange on a new one. I asked him why he was so worked up over the used car in exchange for new.

"Look over there," he snapped, as he pointed to half a dozen used cars setting along the wall. "The dealer keeps half of his capital tied up in old cars that will not sell and there must be a stop put to such a practice sooner or later."

"You really think so, Jack?" I asked.

"No, I don't think so—I know so," he replied, as he started for the office. I followed him and asked him how many used cars he had traded for during the season and his reply was "eight." I then asked him how many he still had on hand and he said "seven."

I inquired how many new cars he had sold and he said "ten." Now what was wrong? Was it the used car or was it the dealer? Let us see. Tim Donohoo, at the Springs, sold, during the same length of time, 24 new cars, taking a used car in exchange each time and he had just one on the floor at the time Jack had seven. Was the trouble the used car? Decidedly not. It was the dealer.

Tim Donohoo merchandises his used cars just as he does his new ones—that's why he moves them. I am fully convinced that, when a dealer declares that some plan should be worked out whereby no used cars should be accepted in exchange for new ones, he is playing the wrong game and should get out of the business and take to selling prunes or onions, where no trading need be considered. The one solution

to the whole situation is shop equipment, and the sooner the dealer finds it out the sooner he will begin to realize on the used car.

The dealer cannot reasonably expect to merchandise old cars in the same condition as he gets them. They must be rebuilt, and when they are rebuilt properly, they are more easily disposed of, in nine out of ten cases, than is the new car, simply because

Keep Ahead of Your Work.

The person who feels an instinctive dislike to tackling the day's work as he starts to business should find out what's wrong. If he forces himself to go through the paces, he will hold down a job, perhaps, but will he make a success of it? The chances are all against it.

The really efficient worker is the one whose mind and body are attuned to his tasks, who doesn't let his work get ahead of him, or, "on his nerves," and who does it happily, interestedly, and enthusiastically. He never makes the mistake of thinking that smiles were made for leisure hours only, but carries them to business with him. Watch out for him. He's the man to get ahead.—Telephone Review.

it takes less money to make the deal, and the number of us fellows with limited capital who can better afford a rebuilt job than a new car would make an army so large that Napoleon's Army at the battle of Waterloo would look like a peanut drum alongside of our army of noble martyrs.

But, of course, if we buy the used car, it must be worth the money. It must be a serviceable buy and, in order to be this, it must be rebuilt. In order to rebuild it, one must have shop equipment. Ah! There you have the whole solution to this used car problem in a nutshell—shop equipment and some one to use it.

When the used car is properly rebuilt and repainted it will give 80 per cent of the service it will give when new. The dealer has no trouble in selling them and making a fair percentage of profit over and above the cost to rebuild, just as he does the new car, for it is now in such shape that it may be merchandised just the same as the new car.

At the present time, there are many more buyers for rebuilt used cars than there are for new, providing they are properly rebuilt, and this condition will exist for some time to come. Then why should the dealer feel

bad about the used car when he can, with a little effort, make it a merchandising proposition which is as good or better than the new car?

Stop just for one minute and count the new car dealers you can think of, within a radius of 25 miles, who have a little sales-room and a little workshop with a handful of tools for making a few adjustments on the cars they sell. The number will surprise you now, and it will in a few years from now, for the most of them will either be out of the game or have a larger place and suitable shop equipment.

Now you hear some dealer shout: "What is this shop equipment that these birds are bleating about?"

To answer this question, in the fewest words, we say "an investment" and we have it 100 per cent correct.

Can anyone imagine, in this day and age of the world, a mechanic driving the transmission gears from the layshaft with a sledge when there are probably a half dozen manufacturers of presses that not only do this very thing in a few minutes, but can also be utilized for a hundred other uses, such as straightening axles, drifting bearings, shafts, etc.? And the cost is so small that the saving in time in the course of a few months will pay for the press.

Then again, we see some fellow with the rear wheel jacked up, a couple of men on either side, and one with a block of wood and a sledge trying to loosen the wheel on the shaft so he can get it off to reline the brakes. Yes, we see this yet today, while manufacturers are turning out hundreds of wheel pullers that would remove the wheel in one to five minutes and which cost but a very few dollars.

Over in another shop, we see a mechanic trying to reduce a piston with a file when a lathe will do the job in a few minutes and, aside from this, will do so many other jobs that one or two large volumes might be written on the subject and then not cover it thoroughly. The lathe is one of the best all-round tools that could be placed in any shop, large or small, for the variety of work that it will handle in automobile repairing can hardly be estimated.

At the present time, a suitable lathe with chucks, tools, etc., may be had at a very reasonable figure, considering what they can earn for the dealer. For the past two or three years the writer has watched very closely the dealers with shop equipment.

Every one of them dealt in all the used cars he could get in exchange for new.

The fact of the matter is that I have known them to go out of their territory and drive in used cars and rebuild them to supply the used car demand, while the dealers of whom they purchased them stand idly by and condemn the used car as a merchandising proposition. The only difference in the dealers' places is that one has shop equipment and the other does not.

For a fair example of shop equipment and what can be done with it, I wish to emphasize the case of Tim Donohoo at the Springs. To begin with, his shop is large and well lighted. In one corner of it is a room about 20 feet square which serves very nicely for a paint and varnish room.

This room is very light, preventing as much as possible the circulation of air and dust. He has it so arranged that the proper temperature can be had for drying varnish the year round. In another part of the building is a smaller room used exclusively for a battery and electrical room. In this room, storage batteries are rebuilt and made like new and starting and lighting generators are remade and refinished.

In the basement is a large dipping vat, over which a track and hoist have been erected. All parts of the engine and machinery that are covered with dirt and slime are cleaned in this vat so that, by the time they reach the repairrooms, they are just as clean to handle as new castings from the factory and any crack or excessive wear may be located instantly.

As soon as the old car is ushered into the place, the "motor doctors" hold a consultation, after which it passes to the shop, where the body is removed along with the tires, etc. The engine, transmission and rear-axle assembly go to the dipping vat for the bath before the mechanics start to operate.

While these parts are away, the spring shackles and bolts are examined for wear and the necessary parts replaced. The steering gear is carefully inspected and made tight. All frame bolts are gone over and tightened and the cotter keys reset.

When all of these parts have been looked after, the entire assembly is subjected to a sand blast, which cuts all dirt, paint and grease off, leaving it clean, after which it is ushered into the paint shop, where it remains until finished.

The engine is next placed on the bench and the electrical equipment goes to the battery room. The engine is completely taken down, new piston rings and pins are fitted and the cylinders reground, if necessary. The bearings are all refitted on the burning-in machine. The timing gears are either adjusted to take up slack or replaced with new. Push rods, guides and valves are replaced where necessary.

After the engine is entirely gone over in this manner, it is placed in a test stand and run for from six to ten hours, after which it is inspected by the foreman and either passed on or rejected and sent back to the workmen for a final correction.

The clutch and transmission next get a complete overhaul and all necessary parts are replaced or repaired, to put them in good condition.

The rear-axle assembly takes its turn and goes through the same routine of overhaul as does the engine and the transmission.

The fenders are inspected for dents and cracks. The dents are removed with a tool purchased for the purpose, and the little cracks are taken care of with the welding machine.

When the painter has finished with the body, frame, etc., the engine is enameled and the assembly is pushed to completion. By the time the car is ready to run, the upholstering man is on the job with the re-finished top and curtains. The old car, by this time, takes on a different appearance. The foreman gives it a try-out and passes on it, after which it takes its place alongside the new cars and why not? It acts well and looks like new.

When Tim steps into this car to demonstrate it to a customer, he has a feeling of confidence and satisfaction in the job and guarantees the job just as he does the new cars. The man who buys the used car that has been reconditioned properly gets just as big a value for his money as the man who buys the new one.

After all that I have seen done with the used car in this shop, I am thoroughly convinced that the dealer who wants a ban put on the exchange idea has a chronic case of "intellectual stomach-ache" and should get into some other business than the automobile game. What shop equipment has done for Tim Donohoo it will do for every other car dealer in the country.

The question now arises as to how much should be expended for shop equipment to rebuild the used car as it should be? This will, of course, depend upon what the equipment must do and whether or not some of it is to be sent out to other shops—such as cylinder and crank grinding, etc. Of course, a good grinder runs into money, but, when we consider that a number of cylinders can be reground in a day and the price that one gets for this class of work, a grinder is a very good investment. A great deal of grinding may be done for small outside repairshops and, in so doing, the outside work will eventually pay the first cost of the machine.

The lathe should not be overlooked when contemplating shop equipment—neither should a good drill press.

The welding machine is also essential for reclaiming broken parts, straightening and welding frames, etc. A reliable welding machine is in no way expensive when one or two crankcase jobs will pay for it.

The burning-in machine is a necessity, for a dozen sets of engine bearings may be fitted with a good machine while one is being fitted up by the old and tiresome method of scraping. The old method of scraping bearings to get a fit is very tedious, to say the least, and very expensive to the one pay-

ing the bill. Along with such tools as these there should be an electric portable drill for drilling about the frame and engine, wheel and gear pullers, taps and dies, socket and speed wrenches, drifts, punches, chisels, etc.

Supposing this equipment runs around \$3,000. The interest on \$3,000 for one year at 8 per cent would be \$240. Twenty four-cylinder engines reground, at \$3 per cylinder, on the grinder, would pay the interest on the entire investment and 20 engines are hardly worth mentioning as compared to what would be done in 12 months with a fair-sized territory to draw from.

All other articles of shop equipment will pay at about the same rate as the grinder when their every-day uses are considered from an investment standpoint. I have yet to see a well-equipped shop that did not pay big dividends if under the proper management.

Each and every job should be checked carefully for time and a record made of the repair so that, when a car comes in and a decision is made as to what must be done to make it right, the record may be referred to on similar jobs and the cost estimated very closely. The dealer will know just how much expense it will be necessary to add to the used car to make it give his customer service, and can make the customer an offer on short notice.

The deal should be figured so that no sacrifice of profit is made on the new car and a reasonable profit made on the old car after it has been rebuilt and repainted and put in a salable condition. A profit must be figured on the old car, over and above the cost of the car and the expense of reconditioning it, for it must be guaranteed and serviced after the sale is made, just as is the new car. If the used car is handled in this manner every customer is a satisfied customer and every deal represents a profit to the dealer.

As to new tires on the second-hand or rebuilt job, the dealers differ on this subject. Tim declares the new tires are to be given consideration, for most used car prospects look to the tires first of all and, if the tires look bad, they will not even consider the fact that the balance of the car is in tip-top condition. After all is said and done, a used car, which has been completely overhauled and repainted and then is equipped with an old set of tires, looks about like a man with a new suit of clothes and a shabby pair of shoes. It spoils the appearance.

In nearly every instance it pays to use the new casings, selling the old serviceable ones to customers at a price at which they can afford to buy them. There are always plenty of car users who will buy used tires instead of new ones—in fact, they will look for them before buying tires.

After seeing many dealers in the past two or three years who have installed shop

(Please Turn to Page 33.)

Small Tire Tools—Selection and Care

Good and Reliable Tools Are Just as Necessary to the Men Engaged in Tire Repairwork as to Men in Any Other Line of Work—Complete Lists of Essential Tools Given as Well as Suggestions for Their Proper Care

By H. J. White and Lowell R. Butcher

Instructors in Automobile Trade School, Des Moines University

The man engaged in tire repairwork is no different from his brother in some other line of work—he should have good and reliable tools with which to do his work. True, an expert may turn out a fair piece of work with poor tools but, if that same skill is applied and good tools used, the work will be correspondingly better.

The tools enumerated have been divided

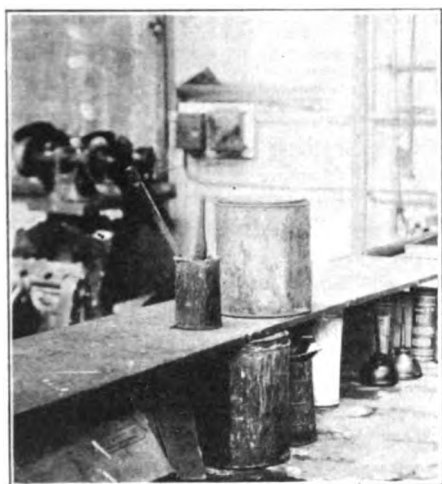


Fig. 1. Cans With Covers Should Be Provided for Supplies of Cement and Gasolene.

into different classes—as general shop tools, tube repair tools, cutting-down tools, building-up tools and the tools needed about molds and for service. The lists are made as nearly complete as possible, although the beginner may not find use for, and may not be able to afford, the variety offered. For that reason the tools that are absolutely essential to a tire repairshop are marked with an asterisk (*). With this beginning, the service man may add the other tools as his business increases and his need becomes more urgent.

General Shop Tools.

General tools about the shop consist of tools which, though not used in the actual repair of tires, are needed to keep the shop and equipment in repair.

- *Blades, hacksaw.
- Brace and bits.
- Brushes, counter.
- *Chisel.
- *Files.
- Funnels.
- *Hammer, claw.
- *Hammer, machinist's.
- Level.
- Pliers, combination
- *Saw, hack.
- *Saw, wood.
- *Vise, machinist's.
- *Wheels, grinding.
- *Wrenches.

Use will frequently be found around the shop for the metal cutting hacksaw. Extra blades, assorted as to the number of

teeth per inch, should be kept on hand. A 10-inch saw frame is a convenient size to have, as this length of blade is easily secured. The wood saw, the brace and bits are optional, but any mechanic can see that they would be very useful. Likewise, the counter brush is almost a necessity. The cleaning of work tables and benches is made much easier by a brush of this sort.

A level is useful in setting up equipment, leveling up countershafts, etc., but is not an absolute necessity. The hammer, vise, files and wrenches need no explanation.

A word in regard to choosing the wrenches might not be amiss. Choose a set of heavy, drop-forged end wrenches, include a 12-inch monkey-wrench, a medium sized pipe wrench and you have a variety that will handle most of the work you encounter.

Tube Repair Tools.

- *Brushes, wire buffing, cement.
- Deflator, tube.
- *Pliers, plugging.
- *Roller.
- *Screwdriver.
- *Scissors.
- *Stitcher.
- *Valve tool.
- Vulcanizer, gasolene or acid-chip.

The uses of the brushes mentioned are apparent. Cement brushes should be $\frac{1}{4}$ -inch to $\frac{3}{8}$ -inch wide, and a sufficient number used so that it is not necessary to use the same brush in different cements. The buffing brush is made of wire and is used for cleaning and roughing a tube for repair.

The uses of the plugging pliers, the roller and the stitcher were discussed in a previous article on tube repair. They are absolutely essential to good tube work. The tube deflator mentioned is useful in forcing the air from a tube before tying up after repair.

The valve tool is used for several purposes—removing cores, reaming valves and cleaning battered valve threads. The gasolene or acid-chip vulcanizer is mentioned because it can be used in turning out quick tube repairs when the tube plate is cold. It is a convenience but not an absolute necessity if the shop has a tube plate in connection with the molds.

Cutting-down Tools.

- *Awls, locating, and scratch.
- Brush, wire.
- *Cans.
- *File, three-cornered, six-inch.
- *Goggles.
- *Gage, tread.
- *Hooks, section.

- *Knives, fabric, skiving, tread and rubber.
- *Mandrels or plugs.
- *Pinchers, carpenter's.
- Probe.
- *Rasp, wood.
- *Rule, steel.
- Scraper.
- Screwdriver.
- Spreaders, tire.
- *Stone, sharpening.

Locating awls are forced through the fabric from the inside at both ends of the injury. Their use marks the exact length of the injury and aids the marking that is done before cutting down is started. Scratch awls are used for prying up corners of the fabric or starting cords.

The wire brush is used for cleaning the inside of the casing when a flexible tube buffer is not included in the shop equipment. This brush must be narrow in order to be used on the inside of the casing. It is not a good plan to try to use the same brush for tube work that is used for cutting down. Time will be saved if one conveniently shaped brush is used for each purpose.

The cans mentioned are used for holding water, gasolene and cement, Fig. 1. A cover should be provided for each can. Ordinary syrup cans are excellent for this purpose.

The three-cornered file should be about six inches in length. It is necessary for notching and sharpening the hook on the fabric knife. Goggles for the equipment should not have colored lenses. They are used when buffing tires or using the emery wheel. This item should be found and used in every shop where wheel buffing is done.

The use of the tread gage was mentioned



Fig. 2. Straight Edge Should Have a 45-Degree Head for Cutting Materials on the Bias.

in a preceding article on retreading. Its cost is small and its use helps to make the cutting down for retreading much easier. Section hooks are used to hold the lay-back out of the way. They may be made of heavy wire in the shop.

At least four knives must be included. The blade of the fabric knife is one to 1½ inches long and has a notch at the outer end which is used in cutting the fabric for step-downs. A worn rubber knife can be utilized to make an acceptable fabric knife but the beginner had best purchase his first one.

A skiving knife has a blade about four inches in length that is tapered to a point at the outer end. Its shape adapts it to trimming or rounding an injury. A tread knife is about the same length as a skiving knife, but is straight except for the outer end which is rounded. It may be purchased or ground to shape from an old rubber knife. In cutting the tread for the lay-back it will be found to be indispensable. A rubber knife has a 6-inch blade and is useful in general trimming and cutting away.

The wooden mandrels or plugs referred to are made in shapes and sizes to hold the tire to shape while cutting down is done. Another set is made to turn the tire over when doing inside work. These may be made by the repairman in odd moments.

Pinchers of the carpenter's type are used for gripping fabric or cords for removal. A probe—so-called because it is used to insert between plies to determine the extent of injury or separation—is a long, flexible steel blade on a handle. A very satisfactory one may be made by grinding the teeth from a discarded hacksaw blade. A wood rasp is very essential for roughing or cleaning the repairwork. One that is 12 or 14 inches in length makes a very satisfactory tool.

The use of the rule is obvious, for some methods of measuring must be at hand. One made of wood will do, but the steel scale—although more expensive—is preferred. The tire scraper is a three-cornered steel blade which has a handle fas-

tened to it, at right angles and in the center. It is useful in cleaning the inside of a tire that is too heavy to be turned. The screwdriver should be short—four inches is long enough. The point should be sharpened just a little. It is used in loosening treads and layers of fabric.

Tire spreaders are necessary for holding the tire open while doing inside work. Wooden blocks may be used, but the metal type with cast-in notches is not expensive and is much more satisfactory.

Some kind of a sharpening stone must be at hand to hone the knives from time to time. One which is two inches wide by eight inches long will suit the average repairman. Preferably the stone should be fine grained.

Building-up Tools.

Some of the building-up tools are almost identical with those listed as cutting-down tools. However, cutting-down and building-up are usually done, each at a particular bench, and a complete set of tools for each operation will eliminate much running around. In general, the tools listed for building-up are the tools that are needed on the job from the time the tire is buffed until it is ready for the curing mold.

- *Awl, punching or perforating.
- *Brushes, cement.
- *Cans.
- *Hooks or rack.
- Mallet, rubber.
- *Rollers, straight, concave and convex.
- *Rule.
- Screwdriver.
- *Scissors.
- Spreaders.
- *Stitcher.
- *Straight-edge.

The perforating awl is a short awl used for punching holes in the new gum before curing. This helps to eliminate air pockets that might otherwise ruin the cure. The cement brush used in building-up work should be about four inches wide. It is a good plan to store the brush in a can containing a quantity of high-test solvent.

The cans mentioned are for holding gasoline, water and cement and should be similar to the type already described.

Hooks are needed for suspending the tire from an adjustable cord while doing inside work. They may be made by the repairman by bending ¼-inch stock to the required shape. A better method of suspension is to use an adjustable rack.

The trimming knife should carry a 6-inch blade, shaped similar to that of a rub-

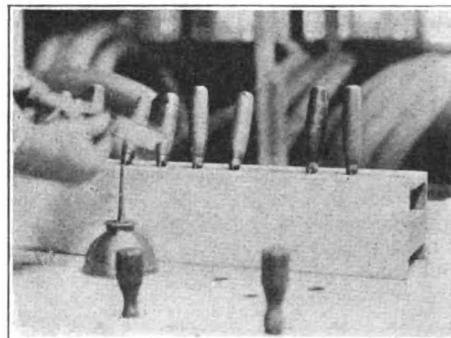


Fig. 4. Clean and Oil Knives Each Night.

ber knife. The rubber or wooden mallet is useful in pounding repairs to insure better contact.

Rollers for rolling the new gum into place should be of three shapes—straight, concave and convex. The straight type is essential in any shop and the concave and convex types are convenient as they respectively fit the contours of the outside and the inside of the tire.

The rule may be either of steel or wood and is used for measuring new materials. A 12- or 14-inch length is preferable. The screwdriver is about the same length as the one mentioned in the cutting-down tools. It can be used in working down the new gum.

Scissors should be heavy and with about a 12-inch blade. The use of the tire spreaders has been explained. These are exactly the same as those previously described.

The stitcher should carry a one-inch diameter wheel, corrugated to perforate the new materials. Its use is essential.

On the bench used for cutting down, a straight-edge will be used. Make this form four to five feet long—depending upon the size of bench—with a head at a 45-degree angle to the edge, Fig. 2. This angular head will prove useful when cutting new materials on the bias.

Steam and Curing Tools.

These tools are used on and about the molds and should be kept racked in a convenient space near at hand.

- | | |
|---------------|------------------|
| *Brush, wire. | Knife, rubber. |
| *Clamps. | *Mallet, rubber. |
| Clock. | Prodding tool. |
| *Gloves. | Rasp. |
| *Gage, air. | *Screwdriver. |

The wire brush is used for cleaning the molds before and after curing. No. 2 emery paper or steel wool might also be added for the same purpose. A pair of C-clamps with an 8-inch opening are necessary for holding the head molds together on clincher tires while the tire is being put in the mold. A clock, watch or time-piece

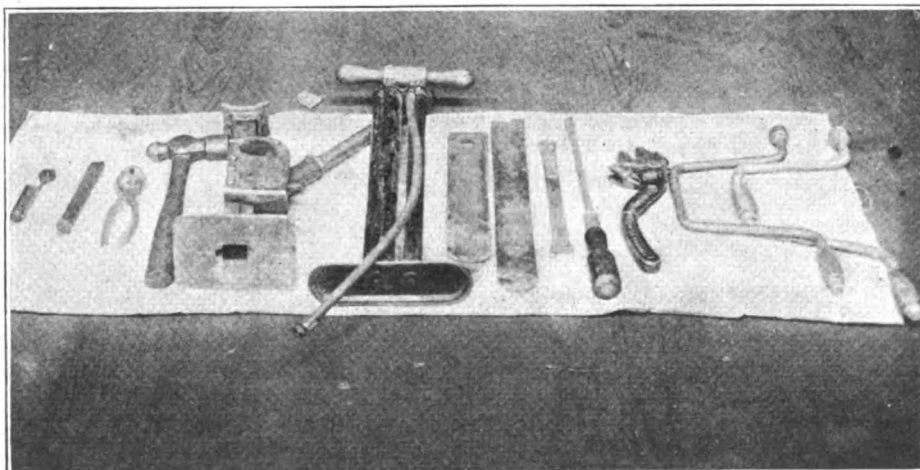


Fig. 3. These Are the Tools Which Are Needed in the Service Kit.

of some description is needed to keep time on the cure. A cheap alarm clock, hung above the molds serves the purpose quite well. The alarm may be set and the repairman warned when a certain period has elapsed.

Gloves are essential in handling the hot bead molds and working about the hot molds. A pair of leather gloves is best, but canvas gloves, faced with leather on the palms, will serve very well and give good service.

Of course the tire gage is used in every tire shop, but one should always be on hand at the molds. Many accidents and poor cures can be prevented if the air pressure of the air bag is checked carefully during the cure. A rubber knife is needed for trimming the casing after the cure is completed. A separate one for use about the molds will save much time.

A rubber or wooden mallet is needed for tapping tires and bead molds into place. A prodding tool, made from an old tire iron, can be used to good advantage in loosening the bead molds or prying the tire from the sectional mold.

The wood rasp is another tool needed for trimming repairwork. The screwdriver, which should be about eight inches in length, will find a variety of uses.

Tools for Tire Changing and Service.

Among the important things to consider in conducting a tire repair business, is the question of quick and efficient tire changing and rim service. This can only be accomplished if the service man has a well selected group of tools for the purpose of giving service, Fig. 3.

It is well to keep such tools in a separate box or kit and to use them for no other purpose. Nothing is more aggravating than to start a hurry-up job of changing tires and be forced to hunt the entire shop through for suitable tools.

- | | |
|-------------|----------------------|
| *Chisel. | *Screwdriver. |
| *Gage, air. | *Tire tools. |
| *Hammer. | *Valve tool. |
| *Jack. | *Wrench, adjustable. |
| *Pliers. | *Wrenches, rim. |
| *Pump, air. | |

A good chisel will find many uses. Straightening flattened rims and starting stubborn rim nuts are possible uses. Of course, all good tire men test the inflation of the tire changed and an air gage is listed for that reason.

The hammer mentioned will find a multitude of uses. Probably this should be of the machinist's type and fairly heavy, say two pounds. Some sort of a reliable yet quick-acting jack must be at hand to raise any weight of car. This may also be put to good use when it is necessary to force split rims into place.

Pliers are needed for loosening valve caps, valve nuts, etc. A 6-inch pair will be heavy enough to give good service. An air pump is included for the reason that some tire changing work may be done away from the shop. Any up-to-date shop will have

its compressed air tank but, unless well-equipped, the service car will not carry a small tank of this sort.

Two or three screwdrivers are very good for changing tires. These should be 10 or 12 inches long and rugged enough to stand considerable abuse. Two or three tire tools should be included for the same use. Sections of old automobile springs make suitable tools of this kind. The valve tool is identical with the one listed with the tube repair tools and is used for the same uses.

An adjustable wrench, preferably of the crescent type, can be used often. An 8-inch, drop-forged wrench will find a maximum of uses. Quick-acting rim-bolt wrenches to fit all common sizes of rim nuts should be included. One or two sizes will handle the rim nuts in general use.

Selection and General Care of Tools.

It goes almost without saying that only the best tools should be bought. Especially is good material necessary in the knives that the repairman selects.

Stitchers are preferably ball bearing and made of a good steel. A stitcher which has corrugations that will not retain their points is worse than useless.

Wrenches should be of the drop-forged variety, either fully or semi-finished. Knives require especially good care and any time expended on them will be fully repaid in time saved in cutting-down or building-up. They should be ground comparatively thin, using a grindstone for this purpose. The edge may be touched up occasionally on the sharpening stone. The trimming knife is never used for cutting-down—use it only on new gum, as the dirt and grit of an old tire will rapidly dull it. The notch in the fabric knife must not be filed too deep or two plies instead of one may be cut.

Knives work better if they are dipped in water before starting a cut. This, however, makes them very liable to rust when they are left for a time unused. It is best to clean and oil all knives each night before they are put away, Fig. 4. A rack, slotted to receive the knives, makes a very convenient way of racking them and prevents any injury or dulling that might occur if they were left scattered about the bench.

Scissors should be kept sharp by using the grindstone or oilstone but never by filing. Hang them up when not using them.

Screwdrivers for cutting-down are slightly sharper than the ordinary tool, although too keen an edge is apt to cut the fabric and should be avoided. Hollow-grind them slightly.

Rollers are kept bright and smooth by polishing with emery cloth from time to time. Keep the bearings well adjusted and, if they need lubrication, use a drop of gasoline. Steel scales are given an occasional cleansing to prevent rusting. Gasoline will help to keep away the rust yet will not ruin a repair if a drop should get on the gum.

If the tire tools are kept well rounded at

the ends, much has been done towards preventing pinches in tubes and cuts in casings. Keep the pump well oiled. If it needs new leathers replace them. Remember it isn't pleasant to inflate a tire with a leaky pump on a hot day.

The tire gage used about the molds is apt to rust if especial care is not taken. When this happens, the slide sticks and the true pressure is not recorded. Give it a thorough cleaning in gasoline occasionally and this will not happen.

The C-clamps used should, of course, be kept well oiled. It is a little hard to keep tire repair equipment in good shape and prevent rusting. Oil cannot, in most cases, be used, for oil and tire repairs do not agree. For that reason, tools must be cleaned much more often. Substitute gasoline for oil as a lubricant.

The man who takes a pride in good tools should take an equal pride in their condition. Buy only the best tools and give them only the best of care. Likewise, the motto of every tire repairman should be: "A Place for Everything and Everything in Its Place."

Far Eastern Republic Sees Future in Development of Roads.

Development of the Far Eastern Republic through more highways is predicted in the booklet "Trade and Industries," which was recently published by the special delegation of that country to the United States of America.

"Together with the railroads and water routes," says the report, "highways are of tremendous importance. The purpose of highways, among others, is on the one hand to carry through the territory of the country commodities for export, and to direct these commodities into the principal routes. On the other hand, the further purpose of such highways is to distribute among the population the imported goods received from the principal routes. By these highways it will be possible to reach the known vast mineral deposits.

"In the near future it will be possible to organize either through the government or by private means automobile and tractor transportation of freight on the same commercial basis as that which is existing at the present time on the railroads and water routes."

Street Railway Is Biggest Automobile User in Georgia.

One hundred and six motor cars and motor trucks are owned by the Georgia Railway & Power Co. This is one of the largest fleets of motor vehicles in the state.

Preston S. Arkwright, president of the company, says: "The time will come when we will be using automobiles as public transportation vehicles in territory where the business would not justify the building of rail lines."

Delco Equipment For 1921-22 Cars

Two Different Styles of Delco Equipment for 1921-22 Cars Described and Illustrated—Some "Troubles" Which May Develop and Suggestions for Remedying Them—Commutator Should Be Carefully Cleaned and Lubricated

By J. R. Bayston
President, Chicago Automotive Institute

The Delco equipment on the 1921 and 1922 cars are of two different styles or types. One is a motor-generator type—or correctly called the dynamotor type—a single-unit instrument; while the other is a two-unit instrument. The Delco systems installed on the Buick, Cadillac, Hudson, Lafayette, Lincoln, McLaughlin, and Wills Sainte Claire are single-unit or dynamotor types of instrument. The dynamotor operates either as a generator of electricity to charge the battery, or as an electric starter to crank the engine.

There are two sets of windings in both the field and the armature. One of these windings operates when the machine is used as a generator, the other when it is used as a starter. The generator armature winding together with the commutator and the generator field coils are connected in the circuit at all times when the ignition switch is on, except when the starting pedal is depressed. In other words, there is no cut-out between the battery and the generator. It might be well to mention the fact that there is no electrical connection between the starter winding and the generator winding on the armature.

When the engine operates at slow speed, the voltage of the generator is hardly sufficient to provide current for lighting or ignition. In this case, the battery is a source of current. At low engine speed, current may flow from the battery through the generator winding and cause the armature to revolve faster than the engine is driving it. When this condition occurs, the over-running generator clutch located at the front end of the generator, permits the armature to revolve faster than the driving shaft. A clicking noise indicates that the armature is doing this. This click will sometimes be heard when the motor is idled or running very slow on a load.

When the dynamotor is used to crank the engine, the starter windings only are used. The unit then operates as a series wound

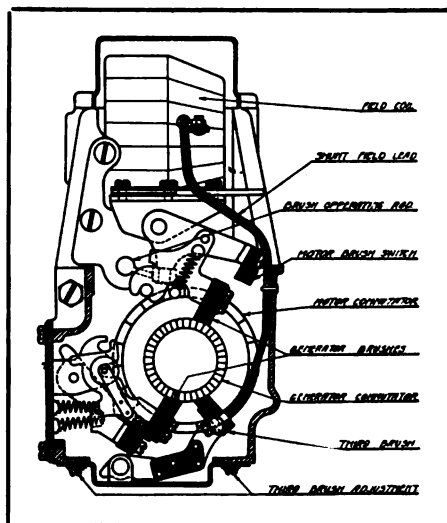


Fig. 2. Buick Equipment Opens the Generator Circuit by Raising the Upper Brush.

starter. A starter button is not used, but instead the circuit is completed in the starter by means of dropping the motor brushes into the commutator, making the complete circuit directly at the brushes.

When the engine is being cranked, the armature drives the flywheel through a pair of sliding gears which are at the rear of the motor generator, as shown in Fig. 1. They are controlled by a starting pedal. An over-running clutch is located in the hub of these gears, so that the flywheel will not drive the generator through the starter gears after the engine starts to op-

erate on its own power, and before the starter pedal is released.

It is very necessary that the driver make a practice of releasing the starting pedal as soon as possible after the engine has started running. This will insure long life and usefulness of the lubricant within the clutch to say nothing of the wearing surfaces in the clutch.

If the starting clutch is not properly lubricated, and the driver has a habit of holding his foot on the pedal longer than necessary after the engine has started, the result may be a sticking clutch. If the clutch sticks, the armature may be spun at such a high rate of speed that it will cause the windings to be thrown from the slot in the armature, thereby making re-winding necessary.

It will be noted, in Fig. 1, that there is one of these clutches in the front of the armature and one at the back. Both of these clutches should be taken apart, cleaned and repacked with light cup grease or vaseline once every season. When the ignition switch is turned on in any of these cars, current flows through the generator winding causing the generator armature to turn slowly, so that the gears can be easily brought into mesh between the starter and the flywheel.

If the gear teeth have a tendency to hit on one another, it is generally due to the armature not "motoring." If this is the case, the brushes may not be making proper contact, the commutator may be dirty, or the brushes stuck in the brush-holders. A loose connection in the shunt field or the starting circuit may also cause this. If the generator seems to be all right, it may be that the battery is weak, in which event the starter will not work after the gears have been engaged.

During the first part of the movement of the starter pedal, the starting gears are shifted into mesh between the flywheel and the armature shaft pinion. In meshing

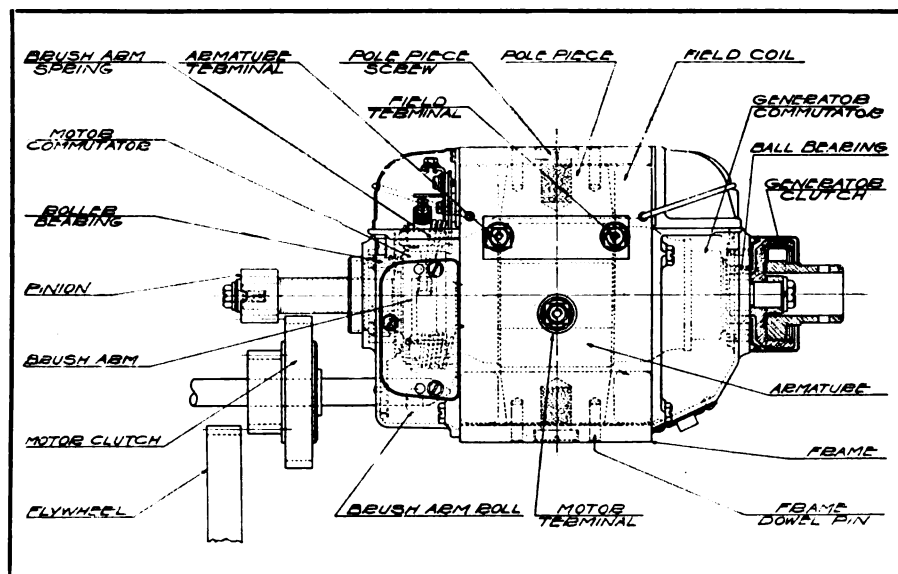


Fig. 1. Armature Drives Flywheel Through Pair of Sliding Gears.

pedal is released. Thus it is possible for the operator to use the starter at once in case the engine does not start at the first application. There is only one terminal on this unit, it being connected to the negative terminal of the battery, using No. 0 or No. 00 cable.

The purpose of the generator is to provide current for the lights and ignition at normal driving. The excess current that is generated recharges the storage battery so that there will always be an ample supply of current in the battery to start the engine as well as for lights when the car is not running.

All Delco generators are of the shunt-wound type. Some of them have four poles, while others have two poles. The four-pole type generally has four field coils connected in series, and the groups in parallel or shunt with the armature winding.

The motor generators used on the Cadillac, Lafayette, Lincoln and Wills Sainte Claire cars, each have four field coils, two of them being the shunt coils, and two the series coils. Each pair of coils are mounted opposite each other in the frame of the motor generator. This equipment operates as a four-pole shunt generator although the field windings are used on two poles only. The remaining poles act as consequent poles, allowing a path for the magnetic lines of force to return to the wound poles.

The cut-out or relay is used in a great many of the Delco systems at the present time. Its purpose is to connect the storage battery to the generator when the generator is producing sufficient voltage to charge the battery; also to disconnect the battery from the generator when the voltage of the battery is greater than that of the generator. This last purpose prevents the battery from discharging itself when the engine is not in operation.

The cut-out consists of a set of contacts that are held open by a spring tension and closed by a magnet. Magnetism is produced from current passing through the coil. When the engine is not running, the contacts should always be open. They are also open when the speed of the generator is so low that it cannot charge the battery.

Around the core of the magnet, there is a double winding. This consists of a voltage coil, or a large number of turns of very fine wire connected across the generator terminals, and a current coil made up of a few turns of heavy wire. The current coil is connected in the charging circuit in series with the contacts and is energized or magnetized only when the contacts are closed.

The actual closing of these contacts is caused by the magnetism created when a very small current is passing through the line or voltage winding of the cut-out. This occurs when the generator operates at sufficient speed to charge the battery. If it is necessary to make an adjustment

on the cut-out, the following instructions should be carefully followed:

Fig. 5 shows a sketch of this cut-out. In it, *S* indicates the air gap between the end of the core and the armature *A*. This distance should be between 0.025 and 0.035 of an inch, when the contacts points are closed. If this distance is not proper, it can be varied by bending the brass stop with a pair of pliers. This adjustment is very important as the amount of the air gap determines the time the points close.

The gap between the contacts, *P*, is automatically taken care of by the adjustment of the air gap. The width of the gap should be between 0.046 and 0.062 of an inch. The contact points should always meet squarely; that is, they should touch at all points. The brass blade carrying the moving contacts should always be straight and parallel to the surface of the armature *A*.

To clean the contacts or square them up, a strip of fine sand paper should be drawn between the contacts while they are held together lightly by the hand. The end of the blade carrying the moving contacts may be prevented from rubbing inside of the relay cover by grinding or filing off the end of the blade to a point 1/64-inch from the side of the contact.

If it is desired to check the voltage at which the relay points close, a voltmeter capable of indicating at least 2 to 15 volts should be used. Connect one of the voltmeter leads to the terminal *X* and the other lead to the relay base or generator frame. If the needle of the voltmeter deflects in the wrong direction, the lead to the voltmeter should be reversed. Then slowly speed up the engine and observe the voltmeter reading.

The contacts should close at from 7 to 8 volts on all relays except those on the Pierce Arrow equipment which are adjusted to close between 6¼ and 6½ volts. Any necessary adjustment should be made by bending the lug, *L*, slightly. A thumb-nut adjustment is sometimes provided on a spring on the earlier type of this relay.

Increasing the spring tension will raise the cut-out voltage; decreasing the spring tension will lower it. An ideal adjustment is an air gap as small as the limit will permit so that there will be an appreciable tension in the spring.

The relay contacts should be closed above the car speed of approximately six to eight miles per hour in high gear, or a corresponding lower speed in intermediate or low gear. The contacts should separate with a discharge from the battery to the relay. This discharge should always be less than three amperes when the points open. The correct condition will be indicated by the ammeter on the cowl. If this ammeter indicates about four amperes, it is correct as the ignition does not pass through the relay and the ammeter reading includes the ignition current.

As soon as the relay contacts close, the ammeter on the dash should indicate that the generator is charging the battery. If it becomes necessary to drive the car in high gear at a speed faster than seven to eight miles an hour before the ammeter shows a charge and the relay points have closed, do not jump at the conclusion and say that the cause is a defective relay or that its adjustment is incorrect. It may be that the generator has an oily commutator, resulting from excessive lubricating of the generator bearings. This may prevent the generator from building up sufficient voltage to close the relay contacts, although the relay may be in perfect condition and adjustment.

Before making changes in the cut-out relay adjustment, the generator commutator should be carefully cleaned and greased, black spots and abrasions removed. The spring tension and teeth of all the generator brushes should be examined carefully, especially the third brush. After the generator has been given this attention, and an improvement in the cut-out is not made, it may be carefully adjusted according to the previous instructions given.

If a great amount of trouble is experienced on a certain generator, due to an oil film on the commutator, the oil throwing collar or the felt washer should be carefully examined, as it is possible that they are allowing this excessive lubricant to pass.

Abnormal Wear of Valve Seats Caused by High Temperatures.

Unless gasoline engines are so designed that the heat generated by slow-burning mixtures or pre-ignition is rapidly dissipated, the exhaust valve seats may reach such temperatures as to cause excessive wear of these parts.

The Bureau of Standards of the U. S. Department of Commerce has recently conducted an investigation to determine the cause of excessive wear of exhaust valve seats of certain engines. This condition only occurred in engines of a certain type and all engines of this type were not affected nor was the wear of all the exhaust valves of a single engine the same.

After numerous experiments to find a cause for this trouble, including an inspection of the metal from which the cylinders were made and a study of the design of cam and valve spring, it was found that the difficulty was due to the high temperature attained by the metal.

When the valve and seat were heated to a high temperature by a reducing flame, the wear of the seats was sufficiently rapid to amply explain the difficulty. After this probable cause of the trouble was determined, it was found that the cooling of the valve seats which showed the greatest wear was defective, thus permitting them to attain an excessive temperature under conditions which often occur in practice.

Welding, Cutting and Brazing Practice

Having Considered Furnishing and Arranging of Oxy-Acetylene Welding Shop, and Uses and Limitations of Welding Flame, the Next Step for Students of Oxy-Acetylene Welding Process Is Flame and Rod Manipulation

By David Baxter

In preceding chapters we have discussed the furnishing and arranging of an oxy-acetylene welding shop, wherein automobile welding was to be the principal line of work, although such an establishment could very well handle a general repair business, including truck and tractor work.

We have also considered the welding flame, its uses and limitations, in connection with the filler rod. Let us now take up the manipulation of the flame and rod as the next step for the student in the oxy-acetylene welding process.

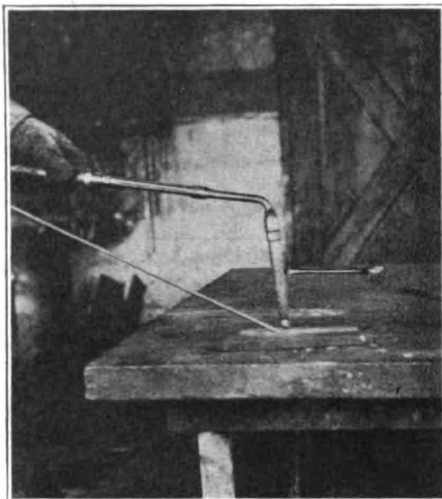
This will be covered in a general way, since there are many styles and makes of torches now on the market and this instruction should apply to all. Later, as we come to the welding of different metals, we can be more specific on the subject of flame and filler manipulation, for, while the welding process, as a whole, is practically the same for all metals, there are many little details which apply solely to each variety of metal.

First the torch is selected and fitted with a certain sized tip, according to the thickness of the metal to be welded. The flame size is selected according to the thickness of the metal, through which the weld is to run. This will be explained more in detail as we study the welding of each separate kind of metal, since the kind of metal also has some bearing on the flame size.

We have shown that the welding job should receive a certain amount of preparation previous to applying the flame. This includes cleaning and scraping the line of welding and the beveling of the parts to be joined, where such is needed.

The former is for the purpose of pre-

venting foreign substances from entering the molten weld and the latter to make the welding easier. These, with other details, we have studied in previous articles, including the various graduations of the



Welding Away From the Operator With the Flame Preceding the Filler Rod.

flame, which appeared in the article last month.

The next step, then, after the torch has been lighted and the flame regulated, is the manipulation of the flame in relation to the groove and filler rod. It is to this part of the process the student welder should pay particular attention.

The welder usually stands erect, but for long jobs he can arrange to sit down. He usually holds the torch in his right hand and the rod in his left, but this may be reversed if desirable. His grip on the torch handle should accord with the balance, using the hose to maintain it. An easy position should be taken, since awkwardness tends to cause trembling and fatigue, which, in turn, have an adverse effect upon the melting.

The flame, where possible, should be pointed in the direction of the welding. This rule is mostly for beginners, however, since they are liable to miss one edge or the other of the groove. After a novice has become quite proficient, he need not pay so much attention to fixed rules for handling the flame. In fact, he will learn that it is better to manipulate the flame according to the progress of the fusion.

At any rate, he should learn to make all of his actions easily natural. The beginner is also often cautioned to weld by pushing the torch along and not by pulling it. This might be an inflexible rule on

some classes of metals, but on others it has been found to pay to hold the flame at many angles during the course of one job. The operator shifts according to the needs of the melting metals and this becomes almost instinctive after a time.

Generally speaking, the flame is held in a slightly inclined position, spreading over the unwelded portion of the groove. If this inclination is too great, the molten metal will be blown forward to adhere to the edges of the weld instead of mixing with the weld metal. The cooler part immediately chills the blowing metal.

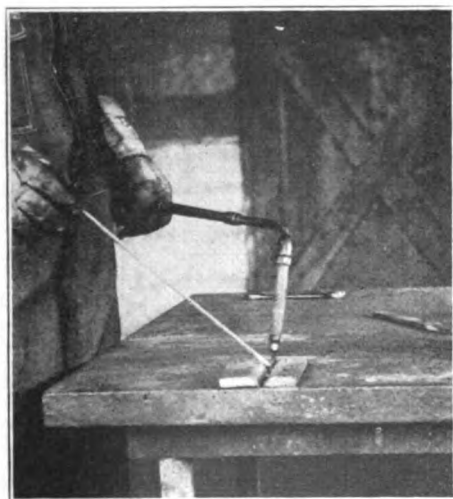
On the other hand, if the inclination is perpendicular to the weld, the heat of the non-melting part of the flame is not used for pre-heating the groove in advance of the welding. Or, in other words, the outer brush of the flame helps to prepare the groove for the coming fusion by pre-heating it. Nevertheless, the perpendicular flame position is used on jobs of great thickness in order to penetrate to the correct depth. It is also used to free the weld of submerged slag or oxide particles. It is literally forced directly into the heart of the weld in order to cut the offending bits of slag loose.

As stated before, many details of the welding process, which are a law for the beginner, may be changed by the expert, or ignored, after he learns to watch the melting and shift the flame accordingly.

As the weld is executed, the flame must be moved forward or with the direction of the welding process; that is, the flame moves onward at a speed which is regulated by the speed of the melting. In other words,



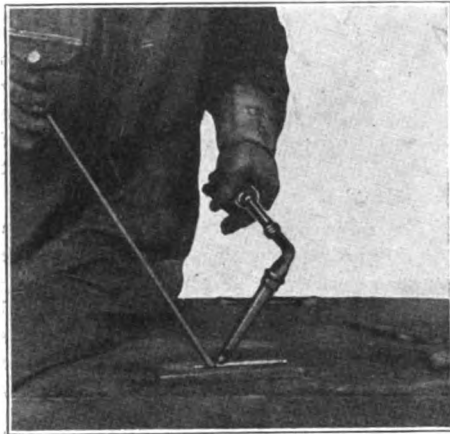
Position of Filler Rod Feeding In By Its Own Weight.



The Rod Is Here Shown Preceding the Flame Along the Groove.

the flame should be moved as fast as the fusion is completed in order to make a continuous and regular weld.

Of course, the flame should be moved laterally in order that the two sides of the groove may be melted in unison. This fusion should be practically simultaneous.



Welding Sidewise With the Flame Preceding the Filler Along the Groove.

The sidewise movement should be frequent and regular.

This lateral movement is sometimes varied by making the white cone of flame describe circular movements, of a diameter corresponding to the molten bath of the weld—just wide enough to take in both sides of the weld. This movement, combined with an advancing movement, gives a series of elliptical curves, the centers of which follow the line of welding.

Another variety, used on especially thick metal, is to proceed in half circles—that is, to play the flame regularly from one side to the other, regulating the speed by the melting of the weld. If nothing intervenes and the melting is rapid, the arcs should be rapidly executed. Taken as a whole, this method produces the best looking weld.

Except in welds where no groove is utilized, the side to side movement is very essential. If it is not employed, one side will flow more than the other and result in ragged, if not weak, welds. As much metal should flow from one edge of the joint as from the other except in unusual cases.

To sum up the question of flame manipulation, perhaps the best rule would be to urge the student not to adopt any special style, but to handle the flame according to the condition of the melting metal and to employ the movement best suited to the progress of the fusion.

The size of the flame also might well be included in this, since a flame really too small may be employed if it is handled deftly. Or a large flame may be employed where a smaller one is recommended if it is expertly manipulated.

The angle at which the flame strikes the weld, in conjunction with the inclination of the filler rod, is an important matter for the beginner to consider. But, like the matter of flame size and movement, this

should be governed to a large extent by the melting of the weld; that is, no fixed position should be maintained throughout an entire weld unless conditions warrant it—rather, the angle of the rod and that of the flame may be changed several times during the fusing.

The student should endeavor to learn to shift the rod as the weld changes, in order to be ready to meet unexpected obstacles. He should not move the rod according to a fixed formula without regard to effects or results.

Usually the welding rod is held and guided by the left hand of the welder. If the rod happens to be thin and flexible, it should be bent in several places to prevent vibration and deviation at the weld. It is selected and handled according to the thickness of the parts to be welded.

Generally speaking, it is inclined more for thin welds and is held more nearly perpendicular as the thickness of the metal increases, with due regard to the kind of metal. The wide angle is to supply less metal to the weld, while the rod held perpendicular feeds more filler metal into the molten bath.

The melting of the filler rod and the sides of the groove should take place at nearly the same time, so as to make the metals mix immediately with each other. The molten bath should be fluid enough to accept the melting rod metal for, if the rod metal flows into the groove before it is ready to be received, the joint will be weak. It will be an adhesion and not a complete fusion weld. This is perhaps the greatest trouble beginners have. They are over-anxious to fill the groove before it is fluid enough to receive the deposit.

The student should endeavor to make the rod melt at the same time the groove melts, or a very short time after the groove melts. He should do this with the least possible displacement of the flame, to accomplish which he can readily see the necessity of changing the inclination of the rod regardless of the kind of metal.

Besides changing the inclination of the rod, it is a good idea to keep the rod in almost continuous motion. But this, too, is subject to variation and should not become a fixed style with any individual. On some metals and on some thicknesses of metals, the rod should be given a general sawing or churning movement, but neither one should be absolute throughout the entire welding.

On other metals the rod is given a twisting movement by a wrist motion or by rolling between the thumb and fingers. Meanwhile, the flame plays over the weld on each side of the rod or around it and back of it as the melting requires, crossing the end of the filler as needed.

At any rate, the melting rod should never be allowed to drip into the bath, since it will chill as it passes through the air and will, therefore, cause a poor bond. A skin of oxide will immediately surround the drop

of metal to prevent it from joining the weld metal.

When the proper moment arrives, the rod is lowered to bring it very close to the melting weld and then the flame is played over it until the end nears the melting stage. At this time, it is lowered into contact with the weld. Then the flame is so manipulated as to melt both the rod and the weld in unison, alternating from rod to bath, as explained above.

For great depth or thickness, the end of the rod is plunged into the molten bath while the white jet of flame is played around it, thus affording some protection to the melting rod from oxidizing attacks of the atmosphere. The rod in contact is fed into the bath by allowing or causing it to flow beneath the upper surface of the bath. It is then fed in and moved along only as fast as the weld will accept it.

In heavy welds the weight of the rod alone is often sufficient to feed it in without any pressure by the torch operator. The rod is allowed to stand upright in the bath, with but a light grip of the thumb and finger of the welder's left hand.

Most welds—and especially what are called plastic welds—are but a regular succession of pools or baths, all joined into one long pool. This is accomplished by practice in manipulation of flame and filler after the student understands the fundamentals of the process.

Usually the beginner either does not melt enough and the heating lacks penetration, or he melts too much and makes a weak joint through insufficient mixing of the metals. In other words, he does not apply the flame long enough to melt deeply or he melts so much that it merely piles up in the groove instead of being taken up by



Another Position of the Rod Preceding the Flame Along the Groove.

the bath. Sometimes he applies the flame so ardently that he melts holes in the job. The happy medium lies between these two extremes.

Holes in thin metal are often very discouraging to a beginner, because when he

(Please Turn to Page 41.)

Making Packing Rings for Automobile

This Concluding Installment of the Article on Making of Packing Rings for Automobiles, Which Was Commenced Last Month, Discusses Additional Operations Necessary in This Work—Useful Table of Decimal Equivalents

By Gustav H. Radebaugh

The lap joint sometimes looks as though it would be difficult to make, but it is not a hard job at all. Notice, in Fig. 13, how the operator is laying out the lap joint. Clamp the ring in the vise and, with an ad-



Fig. 13. Hold Ring in Vise as Shown for Convenience in Laying Out Lap Joint.

justable blade, square and scribe, lay out the joint. This layout is made on the surface where the copper solution was applied. For the length of the lap, refer to Fig. 5, shown in the October issue, where this information is given in the table of sizes for the different diameters of rings.

The lap is cut to shape with a square, safety-edged file. Care should be exercised in doing this job, as it is necessary to file close to the layout lines. This is extremely important as an improperly filed lap loses all the advantages of this style of joint. One of the simplest ways to do this job is to hold the ring in the vise. Fig. 14, where the operator is shown filing the ring.

Do not clamp the ring too tightly, as there is some danger of its breaking. To give a better idea as to just how the ring looks after the joint is filed, refer to Fig. 15. A close inspection as to the accuracy with which the two ends overlap is very

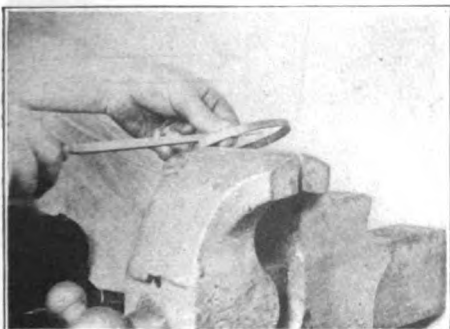


Fig. 14. Safety Edge Square File Used to Shape Lap Joint.

important; also notice, when the ring is compressed, that the ends of the lap joint flush with the side of the ring. If they do not, file the joint a little deeper until a proper fit is made.

Peening Ring to Increase Elasticity.

An old established practice, in the locomotive shops, of peening the ring on the inside to increase its elasticity and durability, has been somewhat commercialized in the manufacture of piston rings for the gas engine. This is very good practice and every set of piston rings made in the dealer's repairshop should be properly peened.

The peening has a tendency to make the ring much livelier and it causes the ring to bear against the walls of the cylinder with a uniform pressure over its inner circumference. Peening gives to the metal a hard, compact surface, and if considerable care is exercised in this operation by delivering blows of even and required intensity, a ring will be made that has the proper resiliency or tension.

As shown in Fig. 16, the operation is per-



Fig. 15. A Close Inspection of Lap Joint for an Accurate Fit.

formed with a ball peen hammer supporting the ring on the face of the vise. The heavier blows should, of course, be delivered directly opposite the split in the ring. These blows should gradually decrease in intensity as the peening operation continues towards the split in the ring. Some mechanics use a cross peen hammer for this peening operation.

The old-timers in the shop use the ball peen, as they believe that the metal under its blow tunes up to a livelier degree of elasticity. The ring is next compressed and held under compression with a soft belt-lacing wire, as in Fig. 17. Observe the lap joint closely to see if it fits snugly together. Notice in this view that the ring has not been completely brought together, as an opening is visible between the end of the lap and ring shoulder.

The proper way to get a close fit of a ring in the cylinder is to turn the outside diameter when it is under compression. To do this job without a number of special fixtures and tools, the compressed ring is clamped on the face plate of the lathe,

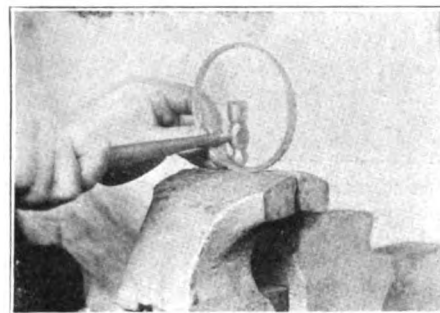


Fig. 16. Peening the Inside of Ring to Increase Its Elasticity.

which has been removed and placed on the bench to make it more convenient to make the "set-up." Four small strap clamps, which are clearly shown in use in Fig. 18, are used to hold the ring in place while the outside is being machined.

In this view it can be seen how paper is used between the ring and face plate to eliminate slippage of the ring during the turning operation. It is not necessary, in this operation, to clamp the ring down securely as it is impossible to know when the ring is centered.

The face plate is next put in place on the lathe, Fig. 19, and, with a parting tool, the ring is centered on the face plate. For turning, this tool should be ground so the point of the toll to the left on the face plate side will do the cutting. By grinding the tool in this fashion a true, even cut can be taken over the entire face of the ring. The taper gives enough clearance near the

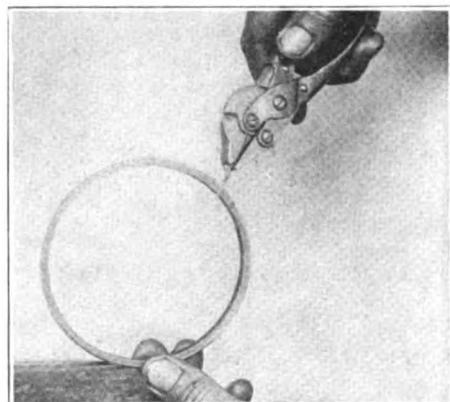


Fig. 17. Ring Is Compressed and Held With Soft Wire.

face plate for a full cut. After the ring is tightened down with the clamps, the wire is removed.

The Use of the Micrometer.

Every mechanic who is associated with engine repairing should understand how to

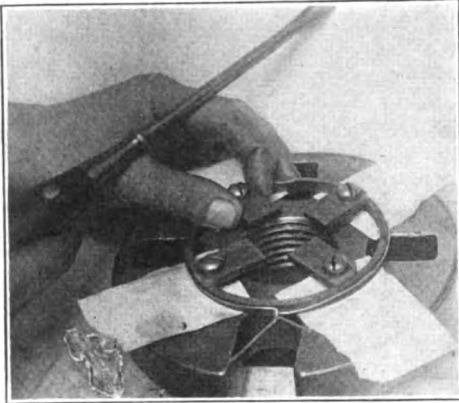


Fig. 18. Clamping Compressed Ring on Lathe Face Plate With Small Steel Clamps.

read a micrometer. This tool is sometimes understood to be a measuring tool that is only to be used by the most skilled, but its usefulness is being more fully understood and is being adopted universally as an easy way to make the correct measurements.

It is extremely simple to use and a few minutes spent in a little practice will give a person confidence in making measurements with it. Several styles of micrometer measuring calipers and gages are shown in Fig. 20, all of these being read in the same manner.

When the micrometer is closed, the beveled edge of the thimble coincides with the line marked "O" on the sleeve, and the "O" line on the thimble agrees with the horizontal line on the sleeve.

Open the micrometer by revolving the thimble one full revolution, or until the "O" line on the thimble again coincides with the horizontal line on the sleeve. The distance between the anvil *B* and the spindle *C* is then $1/40$ or 0.025 of an inch, and the beveled edge of the thimble will coincide with the second vertical line on the sleeve. Each vertical line on the sleeve indicates a distance of four times $1/40$ of an inch, or one-tenth.

In the first of the three illustrations "To Read a Micrometer," Fig. 20, the reading is 0.304, showing 0.300 on the sleeve and 00.004 on the thimble. In the second illustration, the reading is 0.226 showing 0.225 on the sleeve and 0.001 on the thimble. In the third illustration, the reading is

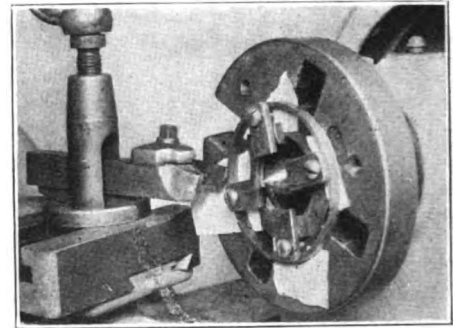


Fig. 19. With Parting Tool Test Position of Ring on Face Plate.

0.224 showing 0.200 on the sleeve and 0.024 on the thimble.

The figures should be taken off the sleeve as hundreds—that is, 100, 200, 300, etc. The thimble is purposely shown close to the lines in the cut, as there are the points where a mistake would be most likely.

In the 0.226 reading, while the end of the thimble may appear to match the cross line, it is evident that it does not for the reason that the zero lines on thimble and sleeve do not coincide but are one space advanced which, of course, we add to the 0.225, making the reading 0.226. The same is true in the 0.224 reading, but the

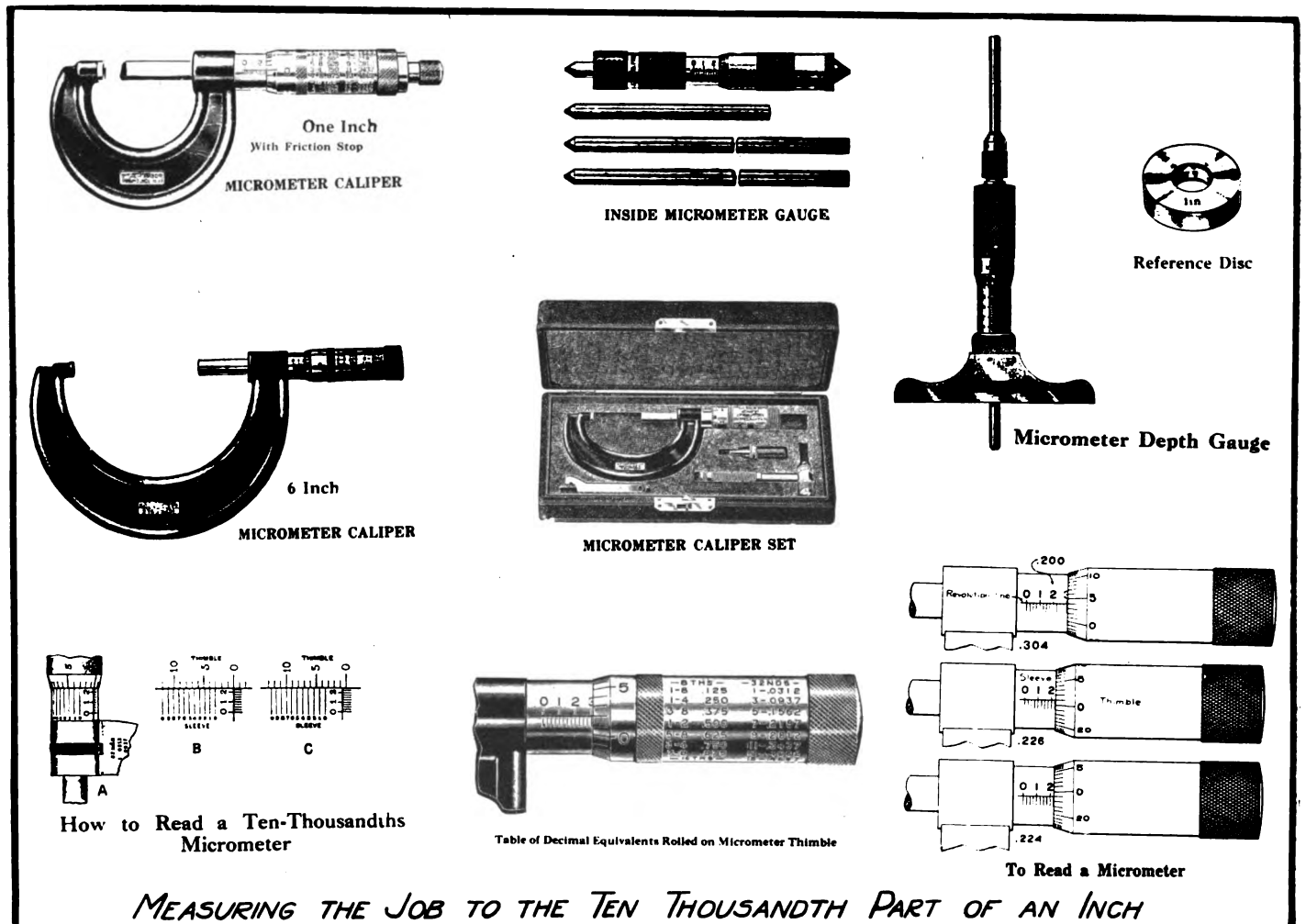


Fig. 20. Micrometer Calipers Necessary Measuring Tools for Repairshop. Micrometer Shown Gives Idea of Assortment Common to Shop.

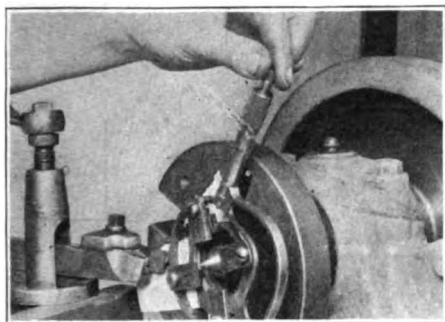


Fig. 21. Measuring Ring With Micrometer Calipers for Correct Diameter.

zero line has gone by one space, making the reading 0.224.

Readings in ten-thousandths of an inch are obtained by the use of a vernier, so named from Pierre Vernier who invented the device in 1631. As applied to a micrometer, this consists of ten divisions on the adjustable sleeve, which occupy the same space as nine divisions on the thimble. The difference between the width of one of the ten spaces on the sleeves and one of the nine spaces on the thimble is, therefore, one-tenth of a space on the thimble.

In diagram B in the lower left corner of Fig. 20, the third line from 0 on the thimble coincides with the first line on the sleeve. The next two lines on the thimble. The next two, marked "5" and "2," are two-tenths apart, and so on.

In opening the tool, by turning the thimble to the left each space on the thimble represents an opening of one-thousandth of an inch. If, therefore, the thimble be turned so that the lines marked "5" and "2" coincide, the caliper will be opened two-tenths of one-thousandth or two ten-thousandths. Turning the thimble farther, until the line "10" coincides with the line "7" on the sleeve, as shown at C, the caliper has been opened 0.0007, and the reading of the tool is 0.2257.

To read a ten-thousandths micrometer, first note the thousandths as in the ordinary micrometer, then observe the line on the sleeve which coincides with a line on the thimble. If it is the second line, marked "1," add 0.0001. If the third, marked "2," add 0.0002, etc.

In using the ratchet-stop micrometer as shown, the 4-inch caliper in Fig. 21 slips by the pawl when more than a certain

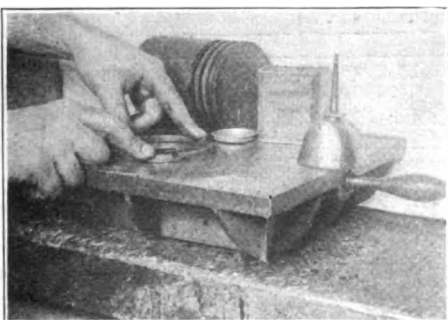


Fig. 24. Sizing Width of Ring on Surface Plate With Carborundum Crystals.

amount of pressure is applied, and so prevents the measuring spindle from turning farther and perhaps springing the instrument.

It is valuable where a number of measurements have to be taken quickly, and especially where measurements are taken by more than one person with the same micrometer as, by its use, the same amount of pressure is applied to the objects measured, in each case.

In using micrometers it is necessary to have around the shop a chart showing the decimal equivalents to the fraction of an inch. The usefulness of such a chart is readily accepted by one who is using the micrometer in making measurements. Such a table is given in Fig. 22.

Fitting Packing Ring to Piston.

Piston rings should never be turned to the exact width, as there is possibility of the groove in the piston varying a little in

| Table of Decimal Equivalents | | | |
|------------------------------|--------|------|--------|
| Inch | | Inch | |
| 1/16 | .0625 | 1/2 | .5000 |
| 1/8 | .1250 | 5/8 | .6250 |
| 3/16 | .1875 | 3/4 | .7500 |
| 1/4 | .2500 | 7/8 | .8750 |
| 5/16 | .3125 | 1 | 1.0000 |
| 3/8 | .3750 | | |
| 7/16 | .4375 | | |
| 1/2 | .5000 | | |
| 9/16 | .5625 | | |
| 5/8 | .6250 | | |
| 11/16 | .6875 | | |
| 3/4 | .7500 | | |
| 13/16 | .8125 | | |
| 7/8 | .8750 | | |
| 15/16 | .9375 | | |
| 1 | 1.0000 | | |

Fig. 22. Table of Decimal Equivalents.

width—especially those that have been in service. After the ring has been turned to the correct diameter it is next fitted into the groove as shown in Fig. 23.

When it is found that the ring fits tightly in the groove, some recommend that the ring be narrowed down by rubbing it over emery cloth supported on a flat board. This will do if no other method is possible, but every shop should be equipped with a surface plate.

Applying carborundum crystals of 220-grain or valve-grinding compound, with a liberal amount of oil on the plate, will make a very suitable base to lap the ring to a proper fit. This job is shown in Fig. 24 where the operator is lapping the ring. Notice how evenly he is distributing the pressure on the ring with his fingers.

Our next operation is to place the ring on the piston. This can be done as shown in Fig. 25. Here the ring is to be placed



Fig. 23. Testing Ring in Groove on Piston for a Snug Fit.

in the center groove. This makes it necessary to use leaves of tin or discarded hacksaw blades to guide the ring over the opposite end groove.

A great many different forms of piston rings have been designed and patented. Many of these rings are now being used in place of plain eccentric or concentric rings. Some rings of the patented class are objectionable in that they are too complicated, and, therefore, easily deranged.

WHAT SHALL WE DO WITH THE USED CAR?

(Concluded from Page 22.)

equipment as the solution to the used car problem, I am thoroughly convinced that any dealer, who will invest wisely in shop equipment and obtain the services of a competent man, will have no trouble in putting the used car business on a firm basis along with new car business and realize a good profit from them.

Buy shop equipment, recondition the old cars and "Ask 'Em to Buy." They'll buy them readily—either on a cash or payment plan, with secured paper.

Motor Vehicles Compete With Camels in Sahara Desert.

Penetration of the Sahara Desert by motor vehicles is one of the latest adventures in transportation, as chronicled by Wilbur Forrest, in the New York Tribune.

French explorers are planning a trip in armored cars into regions which, it is said, white men have never visited. The journey will start about December 1 of this year.



Fig. 25. Method of Springing Ring Into Position on Piston.

Why Customers Send Friends to Us

In This Man's Line of Business It Is Notoriously Difficult to Build Good-Will, Yet He Has Developed More Than a Passive Good-Will in His Community—Published Through Courtesy of System, the Magazine of Business

By F. B. Connelly
President, F. B. Connelly Company

It is in giving service after the sale that many a business is losing today—losing directly on the service, or in the good-will of customers if the service is not charged for at a rate that will mean a direct loss. Especially is this true of any automobile dealer's business. There he often loses the customers he has made through the satisfactory sales of cars and it is there that he may secure the reputation that would bring many more sales to him.

A friend's word goes a long way in the purchase of a car, and service that has not completely satisfied a customer often prevents the passing on of the word we need to make more sales. Our problem in keeping a customer's good-will is not very much different from the problems found in other lines of business.

Two years ago conditions in our service department were probably no worse than in similar departments of many other concerns, but they were not very good. The personnel was changing too frequently. There was dissatisfaction among the workmen, lack of progress, constant complaints from customers; there were dirt, grease, disorder—and no profit. The department scored a loss every time a statement of its affairs was prepared.

It had a telling effect on every part of our business. We were paying a premium to create ill-feeling and were driving the trade away.

We called a meeting of the men in our service department and asked for the benefit of their opinions. All sorts of suggestions were given, and the most obviously valuable were put in effect at once. The men liked the idea of having been parties to the council and began to display a somewhat better spirit.

Then we began a systematic campaign

of correction. All our changes in method and policy we considered through the customers' eyes. It didn't take us long to see that much of the friction with customers existed because we were unable to tell anyone before we started a repair job about how much it would cost.

So one of the first changes we made was in the establishment of fixed charges for as many repair operations as possible. It used to be the practice—and still is in most shops, I believe—to charge the car owner a flat rate per hour for the time necessary to repair his machine and then an additional charge for all material used.

Under this plan, naturally, the owner is charged for any time which the mechanic may consume in diagnosing the trouble, locating tools with which to do the work, securing material, and so on. If the mechanic happens to be inexperienced or a slow workman, the customer pays for his shortcomings.

When the car owner was informed of our hourly charge for the work, he always agreed that it was high enough. When he was presented with the bill, the amount of which was always a mystery when the job was commenced, he was taken by complete surprise. He was certain he had been held up. He was furious and he had a right to be.

I have known of cases—not, I hasten to add, in our business!—where the amount of the repair bill was greater than the value of the repaired car on the second-hand market. Of course, had the owner known what the work involved would cost, he would not have authorized it.

And so this condition was corrected in our service department by the establishment of fixed charges for every operation. These flat rate charges are listed in our

monthly "Service Bulletin" which is sent regularly to car owners. We do nothing but Ford service work.

When the car owner brings his machine to our shop, he is told before the work is authorized by him just what the charge for the labor will be. There is no misunderstanding or dissatisfaction on that account. Since we set the rates for the nearly 300 repair operations, it has been possible for us to decrease these rates—some of them by as much as one-third. These reductions were made possible because of increased efficiency and the installation of improved machinery for speeding up work and doing it better.

And yet, with these lower prices in effect, our service department is making a greater profit than it did a year ago. It has been doubled in size and capacity and nearly twice as many mechanics are employed. During the first three months that these flat rate charges were in effect, the service department scored a greater loss than ever—not because the plan was wrong but because some of the men could not measure up.

In preparing the schedule of charges, we figured a fair amount of time for each operation on the basis of an hourly charge which would represent a profit to us. Naturally, if a mechanic could not produce, he was not up to standard, for many of the men were producing splendidly.

Some of the mechanics, sensing the situation, quit. Many of these men came back later and asked for reinstatement and have made good. In the meantime, they had given some real thought and study to the construction of the car and its mechanism. They had discovered that it was essential that they know why each part was made as it was, why it operated as it did, and so on.

IT IS TIME

To have the Storage Battery in your Ford inspected, tested and "re-watered."

If you will call at our Battery Service Station and present this card we shall be pleased to attend to this for you. There is no charge for this service.

F. B. CONNELLY COMPANY
SERVICE DEPARTMENT
423 NORTH BROADWAY



No. 6618 Date JUNE 30TH 1922
Were you pleased with the work? YES
If not, state why _____
THIS WORK WAS A MOTOR OVERHAUL AND I AM HIGHLY PLEASED WITH THE ACTION OF ENGINE SINCE YOU DID THIS WORK. I CALL IT A-1 WORK.
Were you waited on promptly? YES
Did you receive courteous attention? YES
Do you think we could improve our service to make it more efficient and satisfactory PROBABLY SO. If so, how?
DON'T KNOW. IF YOU DON'T TRY YOU'R APT TO "FALL BACK".

Sign here _____
Address _____

At one of our regular employees' meetings someone suggested that, inasmuch as the flat rate plan worked out so successfully with the customers, it ought to be an equally successful and proper basis for the mechanics' salaries.

In other words, we would pay the mechanic a fixed percentage of the fixed charges made for all work which he performs. We tried the plan and it has been highly successful with us. It naturally makes for speed, but the natural question is: Will it not also make for poor workmanship?

It has not done that in any way. It has, in fact, had the reverse effect. The mechanic rather feels that he is in business for himself. He has his own stall in the shop, his individual bench, his own tools, and outside of business hours he quite naturally solicits business for the service department. He is careful about his demeanor, courteous to the trade and painstaking in his work, because he realizes that satisfied customers mean more business and more business means more work for the shop and for him.

Repairshop mechanics, assembly men, inspectors, and electrical men now are paid an amount equal to 60 per cent of all labor charges received on their job. When more than one man is employed on a job, the 60 per cent of the labor charges is divided up in proportion to the number of hours each man works. Payment to the men is made weekly and figured only on completed work.

There are, of course, some positions in our service department, where the percentage plan of salary cannot be applied in just the same way that it is with the repairmen. The service manager, shop clerk, quick service men, and floorman are paid a salary, but with it a bonus based on the general results of the shop—the net profit. This has been the means of building interest and keeping it. These men are ever on the alert to cut down expenses as well as to increase business.

It is no accident that each man feels responsible for the quality of his workmanship. We have put into effect several ideas just that our men would feel this way about their work. It is definitely understood, as a part of our agreement with each man working in the service department, that all men who work on this piece-work basis will make good without reimbursement any unsatisfactory work performed by them. The mechanic realizes, too, that if

the work is satisfactory the car owner will be inclined to ask for him when he has occasion to return to the department.

As a more constructive and preventive measure, we have tried to build up in each man a feeling of pride in his work. To give the man full credit for any work well done, his name appears on the customer's

the farmer's home 22 miles away. It developed that his trouble was not because of any fault in the work we had done on his car, but we remedied it anyway, and did not charge him for it. That man is still talking about the incident. He is the best sort of an advertisement we could possibly have and is a very good representative of ours in his neighborhood.

Just as we send out these cards after a service job has been done, we send to each purchaser of an automobile 10 days after purchase this letter:

Our interest in the new Ford car which you bought a few days ago did not terminate with the sale of the machine. Our organization comprises more than a "sales department" and we invite you to inspect those parts of our establishment which function only after the sale is made.

The service department embraces one of the largest and most efficiently equipped shops in the Northwest, and is manned by experts on Ford cars. We are endeavoring to apply to this phase of our business the Ford factory principle of high quality and intelligent care in construction, combined with low cost to the purchaser.

Our future sales depend largely upon the successful performance of your car, and we are accordingly more concerned that you shall receive maximum benefits than we are in any immediate profit which might be realized through the operation of our service department.

A monthly Service Bulletin is published by our company. If you do not receive it regularly please tell us.

After the owner has had his car six weeks, he receives another letter from us which says:

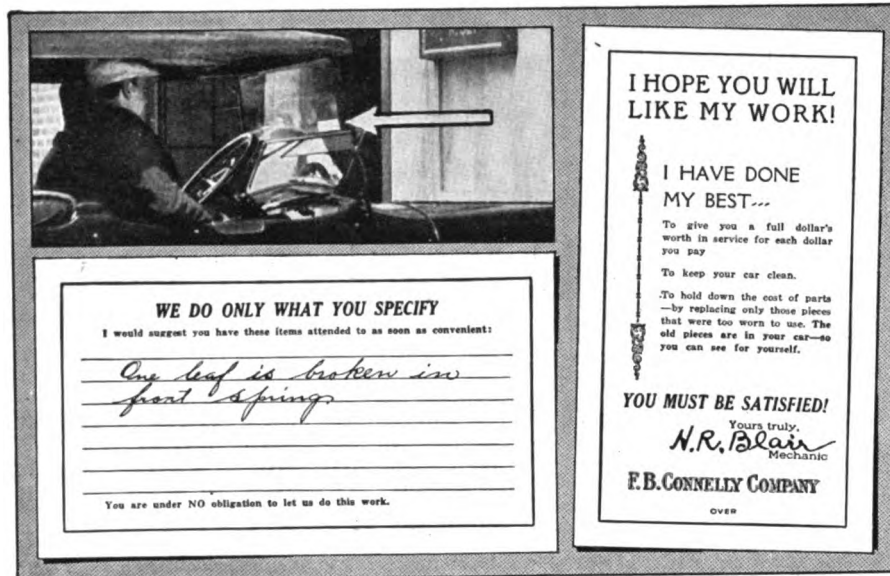
Now that your Ford has been in use for several weeks I would suggest that you have it looked over so you may know that all parts are working in properly.

It is quite often necessary and advisable to make certain adjustments after the machine has been in service for a time and I shall be glad to do this for you.

I am not making this suggestion with any idea of obligating you in any way to spend any money on the car, but rather to prevent any excessive repair bills in the future which might just as well be prevented now.

When you call please ask for me and I'll give your car my personal attention.

In our service department we keep a card record of every Ford car in our territory, the owner's name, address, telephone number, motor number, license number, the dates of his calls at the service department, the amount of all charges made, the nature of the trouble, and so on. The value of this record is obvious.



This Card, of Which Both Sides Are Shown, is left in Car After Repair Job.

invoice. After his job is done, the mechanic leaves in the seat or on the windshield of the customer's car a card which states that he has done his best and which is signed by him. On the other side of the card, there is room for the mechanic to make a note of other jobs that need attention.

That we may have some systematic way of determining just how well satisfied our service customers are, a card is sent to the car owner a day or two after each visit he makes to our service department. The card contains a message asking his opinion about the work we did and inquiring if it was in every way satisfactory. We do not receive replies to every one of these cards, but if there is any cause for complaint we always receive a reply by the first mail.

And when we receive a complaint we satisfy it just as promptly. These cards have brought us all sorts of valuable suggestions from car owners as to the improvement of our service. Some of these owners are druggists, lawyers, doctors, farmers, ministers and, in fact, men in every kind of business and profession. And we get the benefit of their ideas—thoughts that perhaps may have emanated in their own businesses.

One day we received one of these return cards from a farmer who lives 22 miles from town. It read: "After I had driven about 35 miles a severe knock developed. Apparently a bearing was not properly keyed. I am afraid to drive the car to a local garage for fear of more serious trouble. It seems that there was some fault in the work at your shop. I may call the first time I am in town."

We immediately sent a service man to



he stayed in business
when thousands failed
because he Comfort-ized

There are other successful thousands just like him, too. Many of the successful automotive men on record in our office began the year by installing Comfort's one-volume bookkeeping system—the assured foundation for success in your business.

Success in business is not just **luck**. And it doesn't come from hard work alone, either. Why an overwhelming number of garage and repair shop men stayed in the automotive business in spite of a hard season this year, was because they used **Comfort's Forms**.

For this we have their own statements. They let Comfort watch the dollars, cents, stock and labor. With Comfort Forms in use it is impossible to blunder and have stupid losses.

Comfort Forms virtually think for you. They do not add work to your daily business but save time, because with them you can put your finger on any business item instantly and know just how you stand at that minute. No time lost digging through books, no time lost trying to find or understand memoranda carelessly jotted down on stray bits of paper and backs of envelopes.

Many failures really had enough business in their shops to get by on, but profits were lost through carelessness, slipshod accounting methods. Frequently charges were not made for parts, no check was kept on stock bins, labor was under-estimated. These forms of carelessness 365 days in the year will spell ruin for the best kind of business.

If you are COMFORT-IZED your business is insured against such losses and you get from your work every penny due you.

COMFORT PRINTING

109 NO. EIGHTH ST.

Start Right to Finish Right in 1923

Make up your mind NOW to start your business right in 1923. Begin by "ditching" your old-fashioned bookkeeping system. Keep your records in one complete volume, COMFORT'S OFFICE RECORD. You can then go home every night in time for supper and with a carefree mind. You won't be asking yourself if you have forgotten anything. With the Office Record in operation you just can't forget the details of your business.

To appreciate what the Comfort organization has done to simplify your business, read "Making and Saving Profits," a booklet full of valuable information, which we will be glad to send you with no cost to you. The coupon below properly checked will bring you this book and also full details about the Office Record.

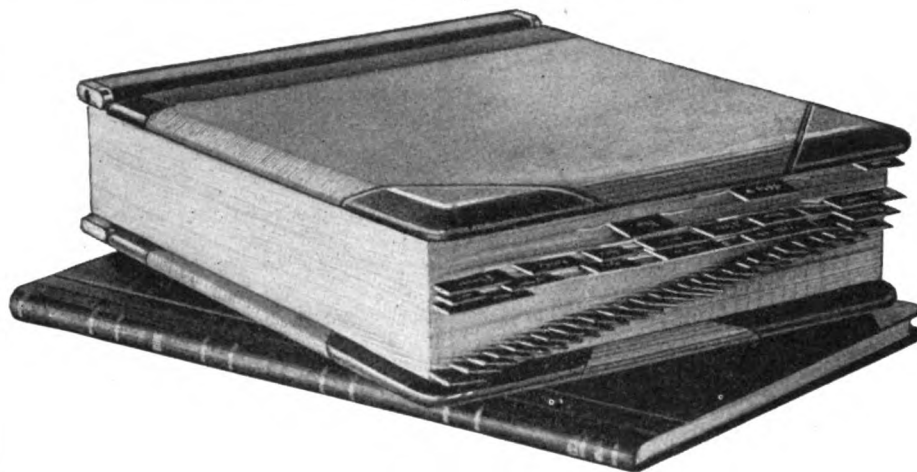
The COMFORT OFFICE RECORD

You buy it but once—it lasts a lifetime

**This Complete System
Costs But—**

\$25

**We Pay
Shipping Charges**



Comfort's Office Record is accompanied by a bound cash book of 150 pages.

COMFORT'S OFFICE RECORD fulfills your need for simplicity and ease in keeping detailed tab on your business. It is a one-volume bookkeeping system designed especially for garage owners, repair men and automobile dealers. Every inch of it means something helpful to you. It is as simple and accurate as it is humanly possible to make such a system. **There is no red tape about it.** It banishes the annual income tax bugaboo forever.

You need no special education or training to use the OFFICE RECORD. Everyday, common sense is your guide. It doesn't matter whether you ever kept books before or not. The contrast to old-fashioned bookkeeping systems makes the Comfort way a holiday, the system is so full of short cuts. There is a place for every department of your business so you can't forget a thing and you can't help keeping your records right.

**Shipping charges to your city on
all forms are paid by Comfort.**

SPECIALTY CO.

ST. LOUIS, MO.

COMFORT PRINTING SPECIALTY CO.
109 No. Eighth St., St. Louis.
Please send me full information on your one-volume
bookkeeping system.
Name.....
Address.....
City.....
Do you also wish our free
booklet "Making and
Saving Profits?" and
(Yes) (No)

From this list we send out cards telling the automobile owner that it is time to have his storage battery tested and refilled with water, and we assure him that we shall be glad to attend to this for him without charge. It costs us something to do this, of course, but the cost is small compared with the good-will and mouth-to-mouth advertising we receive.

The same list furnishes the names of those who receive the monthly Service Bulletin we publish. This is a printed four-page sheet which, with the help of every man in the organization, we try to keep up to standard and full of information which the car owner will find valuable.

This paper provides an advertising medium, not only for the service department but for all the other divisions as well. In it we tell of changes in our price, of new methods of doing work, of improvements in the cars, of changes in the house personnel or policy, and so on.

In it, in "The Query Mill," we answer questions about common car troubles and tell about the proper care of a car. And there is a column of jokes—"A Smile a Minute"—in each issue. This publication is sent regularly to likely buyers of new cars as well as to car owners. It serves to acquaint the prospect with the service he will enjoy if he becomes a Ford owner.

As these service bulletins help to keep our customers informed about our business and convinced that we are doing our best to make the business we do with each other mutually satisfactory, so our employees' bulletins, issued at regular intervals, serve to acquaint our employees with every phase of our business. They tell him of general business conditions, the policies and new methods of the house, talking points about our product, directions about his work, and so on.

These efforts we have made to have our employees learn more about the business and do their work more intelligently have been well repaid. For example, one day not long ago, our service manager came to me and said that he believed a great saving could be made if we were to use natural gas for running motors in our shops instead of gasoline, the cost of which had been a considerable item each month.

I told him to try it. Natural gas had just been piped to Billings from adjacent oil fields. So he designed a mixing device which has made it possible, not only to use natural gas with a considerable saving, but also to get better results.

As the result of suggestions from customers and men we have "Overalls" for Fords as a part of the equipment of our service department. By means of specially designed covers, the seats, fenders and body of the car are protected from grease and damage while the car is in our shop.

All of this sort of thing we tell customers about in our service bulletin. So, whether or not we ever have to use the particular piece of equipment on a man's

car, he knows of it and we acquire a little more prestige from him. Mouth-to-mouth advertising helps us—for people like to tell their friends of something unusual, particularly if it is done at a place in which they have some interest, although it may be only that of a customer.

Partly as a result of suggestions that came to us on the post-cards which we send everyone who has us do a service job, we have recently opened an inspection service. Once a week, or twice a month, or once a month (whichever is preferred), one of our service men calls for the customer's car at a definite time previously arranged for. Then the car is given this attention:

1. The spark-plugs are cleaned and adjusted.
2. The commutator is cleaned.
3. The coils are adjusted.
4. The carburetor is adjusted.
5. The battery is tested and refilled if necessary.
6. The front wheels are lined up.
7. The transmission bands are adjusted.
8. The car is oiled and greased throughout.
9. The springs are graphited.
10. The crankcase of the motor is washed out and the oil changed.
11. Loose bolts are tightened.
12. The headlights are properly focused.
13. The tires are inflated to the proper pressure and examined for cuts, and so on.
14. The car is washed.
15. A written report is made of the condition of the machine.

A reasonable charge is made for these periodical "tonics." If the inspection is made once a week, the charge is \$2; if twice a month \$3, and if once a month \$4.

Each time the car is given the periodic inspection service, a written report is prepared, as explained in the contract, and a copy of it is also made for our files. We have a printed form which the men use in checking over the cars on this service, and from this form the information is obtained to prepare the written report for the owner.

We do the work in a methodical way, have our wash rack equipped with spray nozzles, use a vacuum cleaner for cleaning upholstery, grease guns and sprays for lubrication, and have the usual work racks with lights beneath and every facility to enable the men to attain speed and give proper attention to details.

Because this service keeps the owners' cars in the pink of condition, and because it prevents excessive repair bills and annoying breakdowns, it is a builder of good-will. This phase of our service has reached the point where we maintain a separate department to attend to it, and that department is paying a profit.

Of course, it does a great deal of work not regularly covered by the contract, but which the customer authorizes when the need is called to his attention by the report of the condition of his car. In carrying on this inspection service, just as in doing these other things, we are doing a job that really benefits the customer so unusually

well that he tells others of it and our volume is built up. After all it is only common sense.

Testing of Automobile Engines Under Service Conditions.

The testing of an automobile engine in a laboratory or testing room is a comparatively simple matter. The engine may be mounted on a suitable stand and operated at constant speed and power output, the power being directly transmitted to some apparatus—such as an hydraulic brake or electric dynamometer—which serves to measure and dispose of the power generated, while the rate of fuel consumption can be determined very accurately in a number of different ways.

The conditions of such a test, however, are not identical with those under which an engine operates when driving a car on the road, since in actual service the power output and rate of fuel supply are continually changing, and the support of the engine itself is in motion. It can readily be imagined that the testing of an engine on the road is much more difficult than on the testing stand. The rate of fuel supply is not constant, and it is, therefore, necessary to devise a means of recording the rate of supply at any instant.

Likewise, in actual service, the power generated is disposed of in a large number of ways—such as overcoming friction of moving parts, in so-called rolling losses of tires, in overcoming wind resistance, in accelerating the car, in climbing grades, etc. It is, therefore, necessary to measure the record of these factors separately and add them to find the power output at any instant.

The U. S. Bureau of Standards has recently completed the design and construction of apparatus necessary for making such tests and, although, as may be inferred from the nature of the problem, the apparatus is complex, it has been reduced to a very compact form, so that it can be installed in a car in about one day. The apparatus consists of a photographic recorder, which records the rate of fuel consumption, and another instrument with recording pens which gives on a single strip of paper a record of the following quantities: (1) Engine speed; (2) manifold depression; (3) temperature of inlet water; (4) temperature of outlet water; (5) temperature of oil; (6) temperature of the differential; (7) temperature of air at the entrance to the carburetor; (8) temperature of the atmospheric air; (9) weight of air being used by the engine; (10) acceleration of the car; (11) air speed, and (12) apparent direction of wind.

The record so obtained makes it possible to determine not only the power generated by the engine, but also how its power is used. If it should appear from the record that an excessive amount of power is being absorbed in any one part of the mechanism, improvements in design to reduce the losses would be called for.

Letters of an "Oldtimer" to Beginner

In Which an Old Garageman Tells a Young One Some of the Things Which His Experience Has Taught Him Make for Success in the "Game"—His First Letter Points Out the Great Importance of a Well-Equipped Shop

By B. I. Campbell

Dear Bob:

So you're going to buy the Beaming garage and start in business for yourself, are you? Well, my boy, I'm glad to hear it. You've got a good foundation in your mechanical knowledge—Beaming knew all about a car, even if he was a poor business man, and you couldn't have had a better teacher.

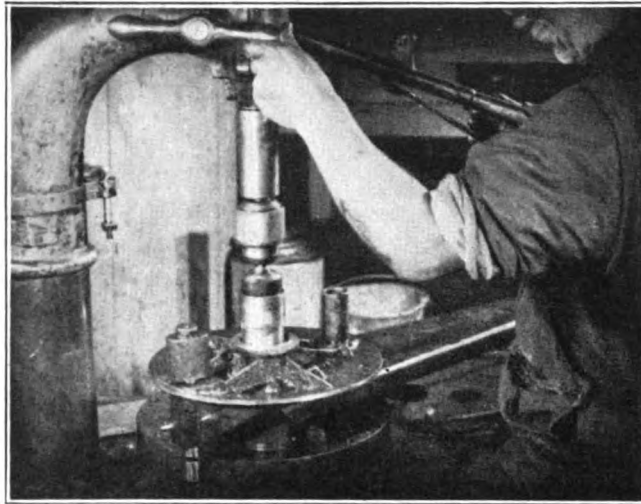
I don't wonder that Beaming has decided there is no money in running a garage nowadays—there isn't for a man who runs one the way he did. Even advised you strongly against buying, you say. That's like Joe Beaming—there never was a squarer, honester cuss living than Joe Beaming, and if he thought you were making a mistake he's the chap that would tell you so.

A capital of \$20,000, such as you say in your letter you can count upon in the form of cash, credits, etc., ought to start you out in pretty good shape. You ought to have about \$3,000 for equipment, about the same amount for your stock of accessories, \$4,000 for tires and about \$10,000 for parts. That looks like a fair apportionment, Bob.

Lots of fellows would advise you against starting in business at this season of the year, as you are planning to do, but I don't. For one thing, you can afford to use enough of your capital to get sufficient equipment of the right sort. I didn't need your letter to tell me that Joe hadn't much in the way of tools and equipment, and what he had wasn't worth much. That's one of the big reasons there wasn't enough profit in the garage business for him.

By putting in the right amount of suit-

able equipment, you will be ready to go after the overhauling jobs strong. I'll bet you can find enough business right around in your neighborhood to keep you and two helpers busy for the winter months—that is, you can if you'll go after it in earnest.



A Drill Press Is Essential to the Well-Equipped Shop.

Of course, you can't get everything you'd like to have now, but here are some of the things I'd suggest—get as many of them now as you can afford and add the others as you can:

An engine stand; a portable power drill; a power grinder; a large drill press; a straightening press; welding outfit; connecting rod aligner; bench arbor press; forge; cylinder grinder; lathe; burning-in machine; and electric equipment for testing and repairing battery and distributor ignition and electric lighting and starting.

Always remember, Bob, that you can get more and better work done with good

equipment, with fewer men and at less cost.

I was talking to Ben Williams at Niantic the other day. I'd heard Al Clayton was running a garage there and, as Al is an old crony of mine, I was interested to know how he was doing.

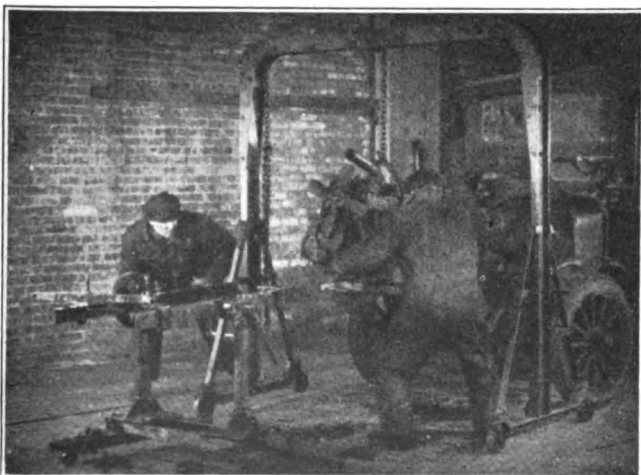
Ever have Al do any of your work for you?" I asked Ben.

"Well," said Ben, "I have had him do some work for me. Al's a fine workman but the trouble is he's too slow. I had a job the other day that I'd have given him if it hadn't been for that. As it was, I took it to Butler instead."

I learned later that Al was short on equipment and was trying to turn out by hand jobs he ought have been doing by machinery. He's got a nice place and was lucky enough to get it located right on one of the big highways—but he's losing business right along, simply because he can't see that with the right tools he'd turn out twice as much work and at better profits.

Where will you get new prospects? For a young chap who's shown the shrewdness and enterprise you have so far, I'm surprised that you'd let that stump you. I sure am. Why you know half the folks in Cass county right now—and three-fourths of them have cars of some kind or other.

Just think over the list of car owners you could name in Canton and the country surrounding—you could mention a hundred right off the reel—and out of the lot you could name at least ten whose cars ought to be overhauled. You'll get every one of that ten, and more too, if you go after them right and show them you have



The Portable Crane and, at the Right, a Statement Showing Economy of Its Use by the Garageman.

| | Cost | Charge |
|----------------------------------|---------|--------|
| To take out the motor by hand | 75 | 1.25 |
| 4 men - 15 minutes each = 1 hour | | |
| with a portable crane | | |
| 1 man - 8 minutes | .12 1/2 | 1.00 |
| | .62 1/2 | |
| You save in cost | | 25 |
| Customer saves | | |
| By hand work you make | 50¢ | |
| " machine " " " | 87 1/2¢ | |

the tools and equipment, plus the mechanical skill, to give them a first-class, workmanlike job.

That's where you've got 'em eatin' right out of your hand, Bob. They know you're a wizard on the "works" of a car. If you could give them good work with that collection of junk Joe Beaming had for shop equipment, what can't you do with tools of the right kind.

And right now you want to start a prospect file—a card index is best. About a hundred 3x5 cards will be enough to start with. Every time you get a new name, make a card for it and add it to your file, always remembering to jot down on that card everything you can learn that will aid you in selling that car owner—whether service or accessories.

Put on your card the name of the car owner—being sure you spell it correctly, as some folks are mighty touchy about the spelling of their names—his address, the make of the car, yearly model and anything else you can learn that is of importance.

Then see every one of these men that you can personally. The personal element is a mighty important one in selling, and many of these men know you and have confidence in your work. They will give you their jobs of overhauling, if you see them personally, when many times a letter would be laid aside and forgotten, and they'd be too busy to give you enough attention if you telephoned them. But, of course, there'll be a lot of them that you can't see personally. So you'll have to write or telephone them.

Follow up every one of them regularly and systematically—that's where your card file is handy again. Maybe you'll see Tom Jones and Tom says: "Well, I'll have to think it over." Of course, you don't let him off that easily—you try to get a favorable decision from him then, but Tom is stubborn. He knows his car needs overhauling and he wants the work done, but he's not going to be hurried into giving

you the job. No, sir! Not Tom Jones. Finally he promises to let you know in about ten days—maybe.

You make a note of all this on Tom Jones' card in your prospect file and, ten days later, you will call upon, see or write



"And Right Now You Want to Start a Prospect File."

him about that overhaul job. Perhaps, in the meantime, you have been able to add a few notes to your card that will help you in selling Tom. Perhaps, even then, he won't be ready to talk business, but you get a promise as to when he will, and down it goes on the card—and at just the time stated, you go after him again. Keep right after them all the time, and you'll finally land them.

Whenever you give a car owner service, be sure to make a record of what you do for him on the card—if you haven't a card, make one. Keep track of his needs. Solicit his oil business every so often for a change of oil. Make a note on the card of the car equipment he needs and hasn't got—if he doesn't buy when you "ask him" at the time you render the service. For, of course, you're going to "Ask 'Em to Buy" the car equipment they lack every time you give them service. Get your helpers interested in pushing your accessory sales. Maybe a little commission on what they sell will stimulate their interest.

At any rate, you've noted on the card of the car owner whose car you've serviced the equipment he needs—and by keeping him reminded regularly of the things he needs, by good sales letters, you will get his business. When cold weather comes, suggest cold weather necessities; when it looks like rain, telephone him if he has no chains. Make a record on the card each time you telephone, call upon or write him, and be sure to see him as often as you can without becoming a nuisance.

It would be well to make a written order for each job and, if it needs something that is not written down, get in touch with the owner before you do unordered work.

Watch the license numbers of the cars that pass your place frequently and put their owners in your card record. Watch new car sales reports, license reports, and every other listing you can find, for new names to put in your file. Make this record the basis of your service selling work.

List on the cards such articles of equipment as the man has not. Solicit him occasionally to buy these items and check them off as he buys them.

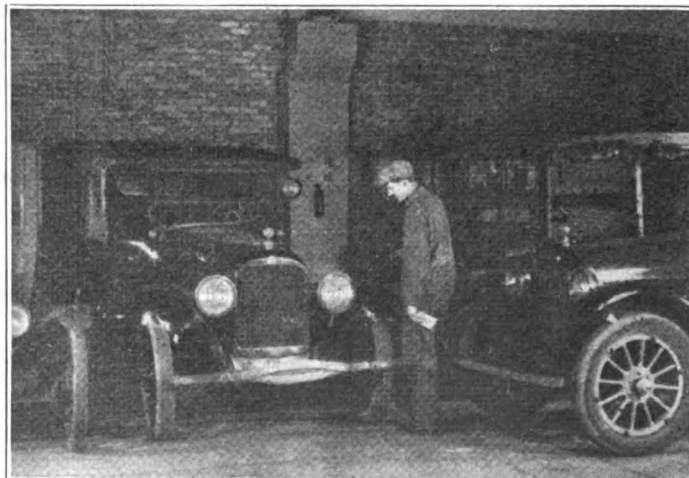
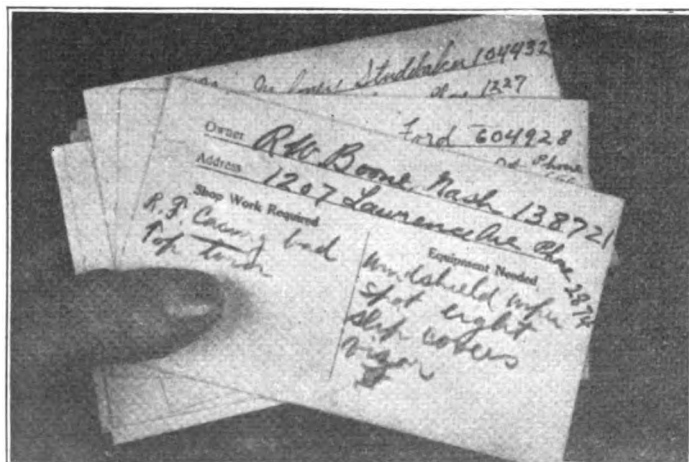
Scan carefully every car that comes to your shop or pump for anything. If you detect needed repairs, suggest them to the owner.

It will be well for you to carry a good advertisement in your local paper, too, telling of the work you are prepared to do in your shop.

One of the best ways to get new ideas for finding prospects is to read your trade paper—why I read of at least a half dozen ways of getting new business that I hadn't thought of in just one of the recent issues of the AMERICAN GARAGE & AUTO DEALER.

You should be able to get lists of the car owners in your county from the Secretary of State, at the state capital. I'd suggest, also, that you keep in touch with the farmers in your locality that have

(Please turn to page 50.)



At Left, Record of Shopwork Needed and Equipment Lacking on Car.—At Right, Examining Car for Possible Equipment Needs.

Welding, Cutting and Brazing Practice

(Concluded from Page 30.)

tries to weld them he usually increases the size of them instead. A great help in overcoming this fault is to incline the flame so that it will be almost parallel to the surface around the hole. In this position the flame does not tend to blow through the metal, nor does it tend to melt so rapidly because the side of the white cone is not so hot as the tip of it.

By holding the flame almost flat the edges of the hole are slowly brought to a plastic state, a little at a time, until the hole is spanned or until tiny bridges are built across the hole. Then, and during the latter part of the operation, the torch is progressively

raised and lowered to obtain the normal action of the flame.

Another quite common fault of the student is that he directs the flame in such manner that one face of the groove is heated more than the other, thus producing partial adhesion.

The remedy has already been suggested, and is not to adopt a fixed method of flame manipulation but to make the action of the flame conform to the melting condition of the weld and filler rod.

Now, in studying the manipulation of flame and rod, the novice should know that the distance between the tip of the white

jet and the molten bath has considerable to do with the success or failure of a welding operation. But this also varies somewhat with the kind of metal being welded, so it is probably better to take the subject up under separate headings as we come to the welding of the different metals.

The illustrations presented earlier in this article on pages 29 and 30 show several positions of the flame and filler rod in relation to the groove or line of welding.

In future articles we will take up this relation of position in specific instances, on certain metals and individual jobs.

How Storage Battery Is Constructed

(Concluded from Page 20.)

rubber. A good separator allows a maximum passage of the electrolyte between the plates, but should be strong enough to withstand the wear of the plates, caused by the jolting of the car, and able to resist the sulphuric acid.

One side of the separator is grooved to allow the gas which is liberated at the positive plate to rise to the surface and escape. Consequently, when assembling a battery, the grooved side of the separator should be placed next to the positive plates.

Separators should be slightly longer than the plates and should be allowed to extend slightly above the plates. Various methods are employed in different batteries to hold down the separators or, in other words, to prevent them from floating. A wooden block placed under the strap serves well and is much used.

Some manufacturers use a thin sheet of perforated rubber between the separators and the positive plates, which serves as an insulator and also to prevent the active material from falling from the positive grids. This device is called a retainer by some manufacturers.

The Willard company has perfected a rubber separator that they call "threaded rubber," and which they use in most of their batteries. This separator should not be confused with a retainer, as it is a complete and efficient separator.

The Luthy company uses a separator made from a material they call "Luthite," which resembles celluloid. It has an overlapping opening that they claim permits free circulation of the electrolyte, but prevents short-circuiting from loosened particles of active material.

Various kinds of wood have been used for separators, but cedar, fir, basswood, redwood and cypress are the kinds in most common use. Probably cedar, of a variety

| Type | Inside Measurements, Inches. | Outside Measurements, Inches. |
|--------------------------|------------------------------|-------------------------------|
| 11-plate, low | 8 x 6 1/4 x 7 | 9 1/8 x 7 3/8 x 7 5/8 |
| 13-plate, low | 9 1/4 x 6 1/4 x 7 | 10 3/8 x 7 3/8 x 7 5/8 |
| 15-plate, low | 10 1/2 x 6 1/4 x 7 | 11 5/8 x 7 3/8 x 7 5/8 |
| 7-plate, low | 11 1/8 x 6 1/4 x 7 | 12 1/4 x 7 3/8 x 7 5/8 |
| 13-plate, low long | 18 3/4 x 3 1/2 x 7 | 19 7/8 x 4 1/4 x 7 5/8 |
| 11-plate, medium | 8 x 6 1/4 x 7 1/2 | 9 1/8 x 7 3/8 x 8 1/8 |
| 13-plate, medium | 9 1/4 x 6 1/4 x 7 1/2 | 10 3/8 x 7 3/8 x 8 1/8 |
| 15-plate, medium | 10 1/2 x 6 1/4 x 7 1/2 | 11 5/8 x 7 3/8 x 8 1/8 |
| 7-plate, medium | 11 1/8 x 6 1/4 x 7 1/2 | 12 1/4 x 7 3/8 x 8 1/8 |
| 13-plate, medium long | 18 3/4 x 3 1/2 x 7 1/2 | 19 7/8 x 4 1/4 x 8 1/8 |
| 15-plate, medium long | 18 3/4 x 3 1/2 x 7 1/2 | 19 7/8 x 4 1/4 x 8 1/8 |
| 11-plate, high | 8 1/2 x 6 1/4 x 8 | 9 5/8 x 7 3/8 x 8 5/8 |
| 13-plate, high | 9 1/2 x 6 1/4 x 8 | 10 5/8 x 7 3/8 x 8 5/8 |
| 15-plate, high | 10 1/2 x 6 1/4 x 8 | 11 7/8 x 7 3/8 x 8 5/8 |
| 7-plate, high | 11 1/2 x 6 1/4 x 8 | 12 7/8 x 7 3/8 x 8 5/8 |
| 7-plate, Maxwell special | 11 x 6 1/4 x 7 1/2 | 12 1/8 x 7 x 8 1/8 |
| Cadillac | 16 5/8 x 4 1/4 x 10 | 18 7/8 x 5 1/2 x 10 3/4 |
| Packard | 13 3/8 x 6 1/4 x 7 | 14 1/2 x 7 3/8 x 7 5/8 |

This Table, Which Gives Both the Inside and Outside Measurements for Battery Boxes That Are Now Being Manufactured, Will Be Found Useful for Reference.

known as Port Oxford, is the most popular at present.

Three general methods of cutting separators are in use at present. The quarter-sawed or vertical-grain separator is considered the best by many battery men, as it affords uniform and maximum porosity. However, it is an expensive method, as it requires considerable sawing and much of the log cannot be used. This type of separator splits rather easily and, unless care is used in handling, many of them are broken.

Some manufacturers slice the separators from the log instead of sawing, as this is a comparatively fast method and no wood is wasted as sawdust. These may be vertical grain or the whole log may be sliced up, thus producing a variety from vertical to almost flat grain. Many firms use this separator and claim good results.

The veneer, or rotary-cut separator, is made by cutting a thin layer from the outside of the log with a long knife, while the log rotates. This type of separator is not

generally considered as good as the other types, but it is cheap and is used by many battery men, especially for rebuilding, with fair results.

The connectors and terminals are the last parts to be added to the battery. Terminals are becoming fairly well standardized and special terminals are on the market that afford an almost universal connection. The connectors are of many shapes, but practically all serve well. The question of appearance is probably the greatest factor in connector design. Many manufacturers desire a rugged appearance and use large connectors, but such connectors are often hollow on the under side, thus giving the rugged appearance and only the necessary amount of lead.

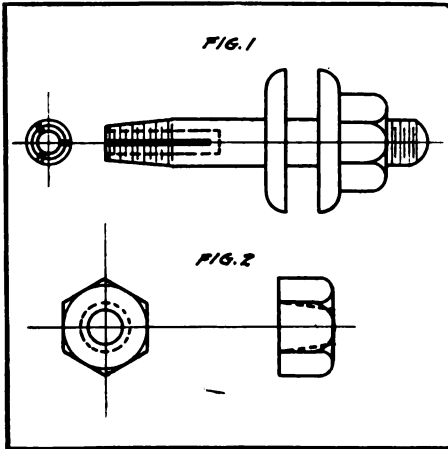
Probably more batteries fail because of careless workmanship than from defective material or design. Most any of the standard types of construction will give reasonable results if made up of good material and by expert workmen.

Practical Hints for Shop Mechanics

Grinder and Pulley Fastener.

An electric motor emery-grinder attachment of considerable utility may be made by the amateur or other workman who possesses a screw-cutting lathe.

Fig. 1 represents an assembly drawing



Figs. 1 and 2. Assembly of Grinder Attachment and Method of Boring Hexagon Nut.

of this attachment, except the compression nut for closing the gripping-sleeve portion of the arbor upon the motor shaft. It will be seen that, except for the tapered end of the shaft, this portion in every respect corresponds to the wheel-carrying end of any emery grinder arbor.

At the tapered end, the shaft is bored to a close sliding fit upon the motor shaft, upon which it is desired to mount an emery wheel. The outside of the arbor is tapered for a suitable distance, varying with the diameter of the motor shaft, and in any case should be—at least in length—twice the width of compression nut that is used.

A thread is cut upon this tapered portion and slots are cut at three or more

equidistant points around the taper, these slots extending beyond the tapered portion as far as the shaft is bored. A hexagon nut is bored with a taper of the same degree as the outside taper of the arbor, and threaded to screw upon the arbor. It is obvious that the tightening of the nut upon the arbor will compress the slotted portion of the arbor fastening upon the motor shaft and make a very secure fastening for the arbor.

Figs. 3 and 4 represent a variation of this idea, which is adapted to fasten a pinion, pulley or other part to a motor or other shaft, in case it is desired to have a very

ONE DOLLAR EACH

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

secure fastening without danger of scoring the shaft. In this case, the part which is to be fastened is taper-bored, as shown by the dotted lines in Fig. 3.

The compression piece shown in Fig. 4 is bored to fit the shaft, tapered upon the outside to fit Fig. 3, has an extension turned straight and threaded, and is slotted from the large end of the taper nearly to the end of the threaded portion as shown.

A plain hexagon nut, of proper size, completes the attachment. The hexagon nut should be counterbored on one side as shown by the dotted lines in Fig. 5, to permit the tapered portion of the compression piece to project slightly beyond the pinion or pulley hub if necessary.—E. K. Minn.

* * *

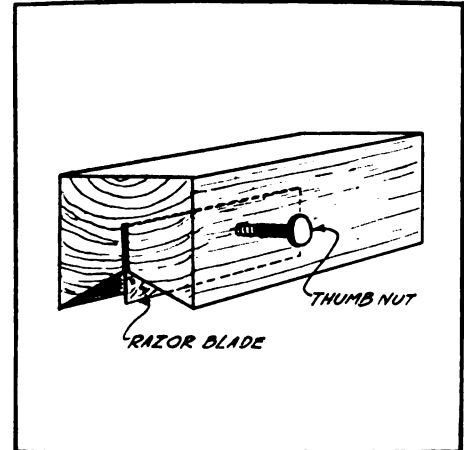
Tool for Removing Insulation.

Opening the insulation on wires is destructive to the pocket knife and the mechanic will welcome this kink for making a handy little tool.

An old safety razor blade is used for the cutter of the tool. The holder is made from a small block of iron and is slightly longer than the blade used. Cut and file a right-angle groove along one edge of the block

and slot from the upper corner of the groove, making the cut about $\frac{1}{2}$ -inch deep. Drill and tap one side of the block to the slot. The razor blade is placed in the slot and held in place with a thumbscrew.

To use, the notch is straddled over the



Handy Tool for Removing Insulation.

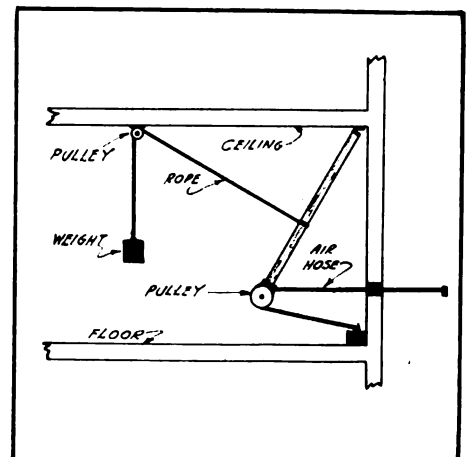
wire and the tool drawn along, cutting down through the insulation to the center of the wire. The blade is easily replaced with another when dulled.—L. R., Ind.

* * *

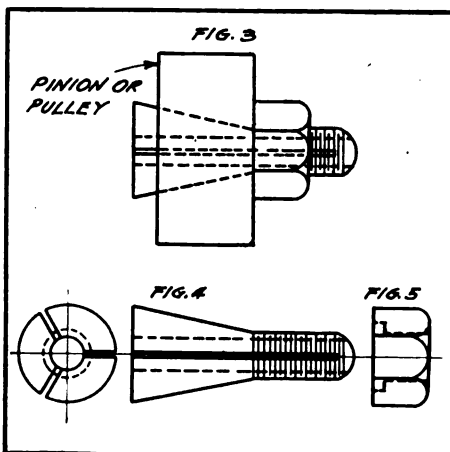
Protects Air Hose.

The illustration shows a practical and inexpensive method for keeping the air hose inside when not in use. When the automobilist wants air, he pulls out the hose. This raises the weight. When the hose is released, the weight pulls it inside again.

Thus, there is no danger of driving over the hose as is often the case when it is left outside. The length of the two by four, extending from the ceiling to the hose, depends upon the length of hose or rather the distance it is to be drawn out when it is to be used.—W. H. B., Idaho.



Weight Pulls Released Hose Inside.



Figs. 3 and 4. For Fastening Pinion or Pulley to Motor or Other Shaft.



"The Sign of a Better Service"

CUSTOMER (pointing to sign): "What does that mean?"

REPAIRMAN: "It's a new service we render. See that sample job just inside? It's absolutely accurate and better than new. I can make yours the same, and it's just what they need. They are leaky," etc.

Conversations like this will occur daily and mean business for you as an Authorized Stormizing Station.

STORMIZING MACHINES

are made in three distinct types, each in a variety of capacities to meet varied requirements.

A Machine for Every Need

The **Heavy Duty Type**, shown here in actual operation, capacity $2\frac{5}{8}$ " to 12" diameter, is suitable for the lightest as well as the heaviest classes of work,—from the lightest motorcycle to heavy truck, tractor and steam cylinders; also hubs of gears, pulleys and wheels, regardless of outside dimensions.

The **Semi-Portable Type**, capacity $2\frac{5}{8}$ " to 6", built for drill press or motor drive.

The **Portable Type**, capacity $2\frac{5}{8}$ " to $4\frac{1}{2}$ ", motor driven or for use with Electric Drill.

We supply with each Machine a handsome permanent metal sign for your place of business, and also a supply of circular matter and suggestions for ads, cuts, etc. Our Advertising Helps are real Business Getters for you.

Write today for complete information on Stormizing.

"Stormizing"

"WHAT'S THAT?"

"THE BETTER METHOD OF CYLINDER REFINISHING"

THE process that turns out a **perfect job** at **minimum cost** of time and labor.

STORMIZING is a method by which you **first** produce a new, accurate cylinder in perfect alignment. The walls are **next** finished to a perfect mirror working polish,—a polish that has heretofore never been obtained by any mechanical means.

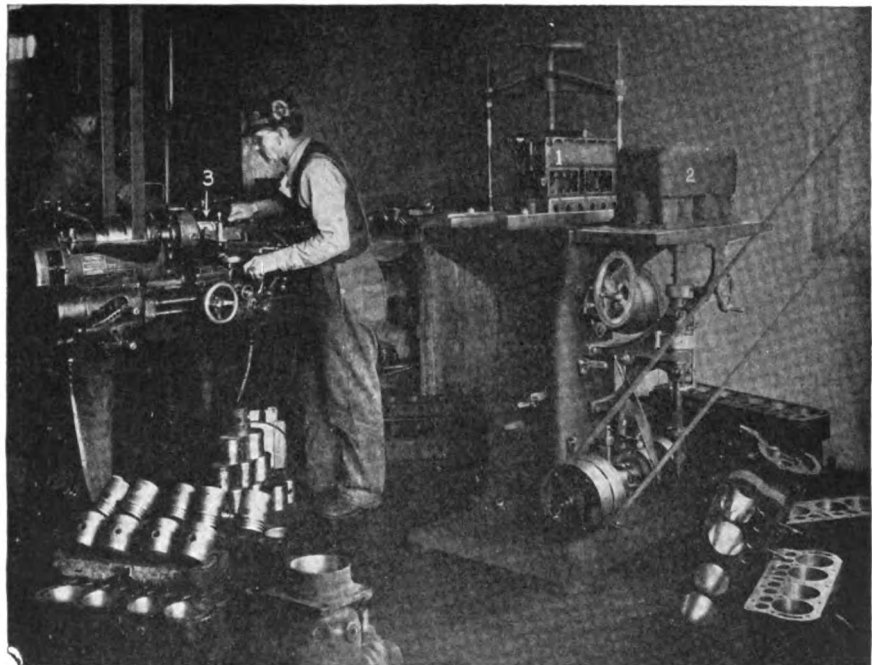
The Machines are **entirely automatic** and **self-centering** for both operations.

Stormized cylinders give lasting satisfactory service.

Increase your business by establishing a STORMIZING STATION.

Don't throw away your profits by allowing others to do this important work. Each job of Stormizing you do builds up a reputation and foundation for future work.

Prepare **NOW** for this profitable business.



"He Does It All"—three operations at once: (1) machining one cylinder block; (2) putting the working polish on another; (3) fitting pistons in the third.

STORM MFG. COMPANY

406 6th Avenue South

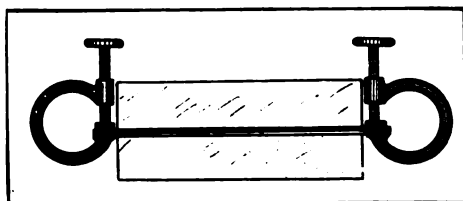
Department E.

Minneapolis, Minn.

Fordson Tractor Clutch Assembly.

The clutch assembly of the Fordson tractor is assembled and disassembled as a unit. The hard part of taking down the clutch assembly is opening the sheet-metal case that encloses the plates and springs.

Some method must be used to hold the two halves of the case together while the bolts are being removed or being replaced. Two medium-sized C-clamps serve very



Clamps Hold Two Halves of Case.

well for this. They should be placed opposite each other, clamping the flange of the case together.

It is possible to relieve the tension of the springs gradually after the bolts have been removed.—L. R. B., Iowa.

* * *

Finding a Lost Bolt.

Oftentimes, when overhauling a Ford car or relining a transmission, a nut or bolt is dropped into the crankcase and remains at the bottom. Also it cannot be seen.

By taking a hammer and getting under the car and tapping the bottom of the case, directly under the magneto, the bolt or nut or other particles will be attracted or drawn on the magnets.

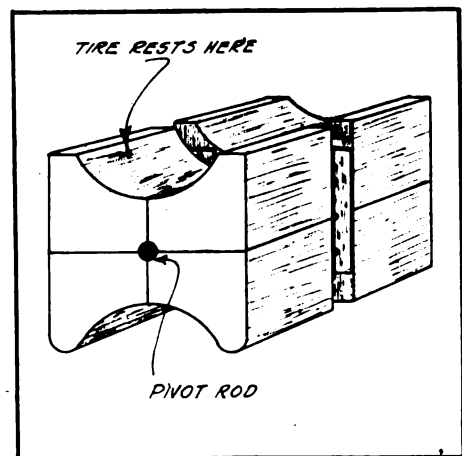
The engine can be cranked and whatever was dropped can be picked off the magnets when they come to the top.—G. V. O., Wyoming.

* * *

Adjustable Tire Display Stand.

The live dealer will sometimes dress a window that contains tires as the featured article. Some method of holding the tire in an upright position is necessary and the holder shown in the sketch will prove very convenient.

Four pieces, shaped as shown, are cut from 1-inch material and a hole bored in



Convenient When Displaying Tires.

each to accommodate the pivot rod. Two of these are hinged together at each end of the rod and located by two nuts on the threaded end of the rod.

The rod, which may be of 1/4-inch to 3/8-inch diameter, is bent slightly in the center, so that the wooden pieces incline toward the center.

The tire to be displayed rests in the two hollows formed by the pivoted members of the stand at each end of the rod. Tires of greater or smaller cross-section are fitted by opening or closing these hinged blocks.—R. B., Mich.

* * *

Draining the Engine Block.

In winter time, on a Ford car, the first place to freeze is the outlet of the radiator, which leads to the side of the engine block. By opening the petcock, some of the water drains out, but generally the passage from the block down is obstructed for a couple of inches back from the lower hose with ice and thereby does not give the block a chance to drain. Thus, the block is liable to breakage from the freezing of the undrained water.

By boring a small hole on the underneath side of the pipe, half-way between the hoses and tapped to fit a petcock, the block can be drained whether the radiator is frozen at the bottom or not.—L. W., Pa.

* * *

Eliminating the Squeaky Wheel.

In many cases, wheel squeaks may be stopped by the simple process of tightening up the wheel bolts. In aggravated cases, even this will not produce results and the driver may seek temporary relief by soaking the wheels with water. However, this will not prove permanent and when the wheel dries it will be in a worse condition than before.

A small piece of sheet metal, cut to a wedge shape, has proven effective in stopping many wheel squeaks permanently. This wedge is tapered slightly at one end and cut slightly narrower than the width of the spoke.

A small sticker is cut off the wedge with a chisel a short distance from the tapered end. This prevents the wedge from loosening and falling out. The sticker forms a kind of barb or compressible head on the tapered end of the wedge, so that once forced into place it will not work out easily.

One of these wedges between each pair of spokes will usually cure the most obstinate "squeakers."—T. W., Iowa.

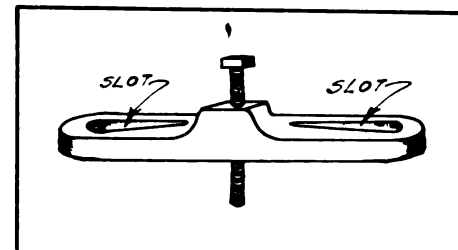
* * *

Easily Made Gear Puller.

Take a piece of iron—or steel, for that matter—about one inch square, sawing it off to about ten inches in length. Heat it and flatten it down from the center out towards each end, to the thickness of half an inch. It will then be about 1 1/2 inches wide.

Bore the hole in the center where it is still an inch thick, about the best suited size—say 5/8-inch—tap out with standard thread and make a screw with a square head about six inches long for the pulling screw.

Then slot the ends with a 3/8-inch drill at the center and use a 1/2-inch drill at the



A Good Home-Made Gear Puller.

extreme end. With the aid of a hacksaw saw out between these holes. Make a few studs, different sizes, and by using some odd bolts you will have a good gear puller.—R. M., Mich.

* * *

Dispensing Heavy Oils.

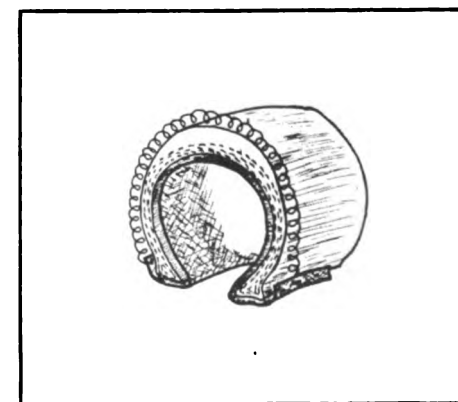
Heavy oils flow so slowly that the serviceman is often called away before the oil is drawn. Quite often, the job is temporarily forgotten and much good oil wasted by the container overflowing.

The oil barrel may be equipped with a device, which will give pressure to the container and a correspondingly faster flow of oil. An old spark-plug shell is screwed into a hole bored in the top of the barrel and a valve stem inserted in the spark plug. A hand pump connected to the valve will give as much pressure as is desired to make the oil flow faster.—A. J., Iowa.

* * *

Spring Holder for Blowout Patch.

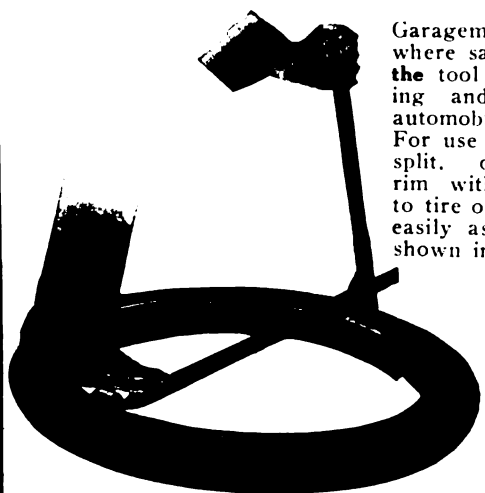
It is very annoying to have the blowout patch slip around the casing while mounting it on the rim. We find, by bending a hook on both ends of a small coil spring and hooking it into the flaps of the patch as shown in the illustration, that the patch will always stay "put." With this arrangement the flaps will stay around the head as it is intended they should.—D. & F., Mo.



Keeps Blowout Patch From Slipping.



When you want a rim tool you want one that is simple in its operation—don't you? And not only simple, but easy to operate. And not only easy to operate, but perfect in its results. That's the Excelsior Rim Tool.



Garagemen everywhere say that it is the tool for removing and replacing automobile tires. For use on any size split, demountable rim without injury to tire or rim. It is easily assembled as shown in Fig. 1.

Fig. 2—The Excelsior in use in contracting rim.

No parts to lose with the Excelsior. No clamps, bolts or sliding arms to adjust. Just grasp a part in each hand, then insert the notched end of the cross bar in the open slot of the handle into the notch corresponding to the size of the rim. Only a light pressure on the lever is necessary.

Fig. 3—Removing tire with Excelsior Rim Tool.

The Excelsior is the rim tool for your establishment. Its price will please you. You'll be delighted with its work.

Write for complete particulars — now.

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Little glass beads on the float keep it from adhering to the barrel due to capillary attraction. Thus it is always possible to get an accurate reading quickly. Tells specific gravity and whether a battery is charged, half-charged or low.

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The Saturday Evening Post

Every month, two and a quarter million auto and radio users are told about the high-grade Hafner Hydrometer. The real need for an efficient hydrometer is explained to them. The fact that the Hafner Hydrometer costs only 75 cents and is worth double is also emphasized in our advertisements.

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Interested?
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Then Mail This
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Please tell me why I should sell Hafner Hydrometers and why I am sure to sell them in quantity and at real profit per sale.

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STREET.....

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STATE.....

Readers' Questions and Answers

Care of Celluloid.

Is there any practical method for preventing celluloid from cracking? Can it be cleaned?—O. M. D., Minn.

Celluloid can be kept transparent and prevented from cracking if acetone is applied to it from time to time.

Acetone can be bought at any paint or drug store.

* * *

Alternating to Direct Current.

In charging a Ford magneto from an alternating current what kind of transformer would be used, or how would you change an alternating current to a direct current.—V. J. H., Ill.

The only way in which alternating current can be changed to direct current is through the use of some kind of a rectifier or converter. These operate from 110 or 220-volt alternating current circuits.

* * *

Setting of Camshaft Gear.

Kindly let me know the proper way to set a camshaft gear on a six-cylinder motor or a four-cylinder motor. Where will it be most effective to give the motor more power and more speed?—F. D. G., N. Y.

The proper valve setting of any engine depends upon many fine points of design, and no two engines are just alike.

The designers choose a setting after careful consideration and often after many tests. The timing should be that specified by the manufacturer. There is no particular difference in the timing on four and six-cylinder engines, of similar cylinder sizes and designed for similar duty.

We cannot be more specific, since you do not mention the engine you have in mind.

* * *

Speed of Rebuilt Racing Car.

I am rebuilding a 1911 model M Chalmers 30 into a dirt-track racing car, and would like to know about what speed I should get after making the following changes:

I am going to install aluminum pistons and rods, Bosch double distributor magneto, and have 32 by 4 wheels with a three to one gear ratio. Please advise me on any other changes which will help to increase the speed.—C. B. R., Mo.

The speed of a rebuilt car depends upon the quality of the workmanship in rebuilding, so an estimate of speed is rather difficult for one who is not familiar with every detail of the job.

Several of this model car have been used for dirt-track racing and have turned a one-half mile track in 33 to 35 seconds, when in the hands of a good dirt-track driver. Quick pick-up and proper balance on the turns is of as much importance on a small

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your—and the more you know, the more money you will make.

Whether you are a dealer, a business, the more you will know salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

dirt track as ability to travel at high speed on the straight stretches.

Your gear ratio may be a bit high, thus causing the car to have insufficient get-away, but this can be best determined by actual tests on the type of tracks on which you wish to race.

By shortening the frame a few inches and setting the motor back at least six inches, better balance should be obtained. The chassis should be lightened as much as possible without sacrificing safety.

Oversized valves, extra strong valve springs, a special high lift camshaft and a special racing carburetor should increase the speed of the engine. All moving parts should be very carefully balanced.

* * *

Engine Knock With Cutout Open.

I have a 1921 Chevrolet on which I have installed a Piel cutout, and when the cutout is open the engine has a knock. When the cutout is closed the knock cannot be heard. Please advise what I can do to remedy this trouble.—E. H. L., Pa.

It would seem that the trouble cannot be very serious if the knock cannot be heard except when the cutout is open.

This engine is rather easily caused to

produce a slight spark knock, as it has rather high compression and has a very compact combustion chamber. This is particularly true if the carburetor is set a bit lean.

You are probably getting better scavenging when the cutout is open and, consequently, a faster burning mixture, which causes the knock.

A larger main jet in the carburetor or the slight use of the choker or possibly just cleaning out the carbon will remedy the trouble. If this is your trouble, the knock should be rather keen and most pronounced when pulling a heavy load.

As you do not describe the knock, we can only give the most common causes. If you had described the knock and told us just when it occurred, we might be able to be more specific.

* * *

Operating Emery Wheel.

Can an emery wheel be operated by an Autolight starting motor, such as is used on an Overland 85? I want to operate it from 110-volt direct current.—L. M. T., Ohio.

This can be done, but there will be some current loss, as resistance will be needed due to the high voltage. Place about a dozen 110-volt lamps in parallel and the lamp bank in series with the motor.

Before closing the switch, see that all the lamps are out and then screw them in, one by one, until the motor pulls the load.

As this is a series motor, it would speed up until the armature throws itself to pieces if it is let run without load or too much current is forced through it.

* * *

Magneto Trouble.

Will a Webster oscillator magneto, when the charge is low, get in a condition that it will run a few hours, say three hours, and then quit supplying enough voltage to jump the gap at the spark-plug, causing the engine to stop?

After the engine is stopped a short while, say one hour, will this magneto recuperate enough to run the engine another three hours?

This engine will run about three hours and then stop. When it stops, it acts as if it had choked down on gasoline. When the carburetor is examined, the adjustment is exactly like it was when the engine was running its three hours and apparently in first-class condition.—W. H. W. & Co., Ind.

We do not think your magneto trouble is due to weak magnets. They would not change in strength during a short period of time and would not be affected by running the engine.

The trouble may be caused by a loose connection, a valve which is adjusted too close, or might be due to overheating.

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**INCREASE YOUR STORAGE
BUSINESS AND PROFITS.
FOLKS ARE WILLING TO
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AUTO COVERS ARE USED**

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Dirt, the Rust, They Keep
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Kennedy covers are made of strong, heavy Kraft paper, properly reinforced. Dust and dirt will penetrate cloth, but cannot get through paper. Standard sizes for 7-passenger cars, 5-passenger cars, Fords, Dodge and electrics.

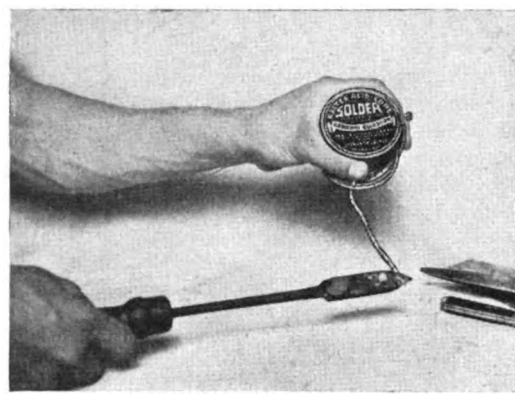
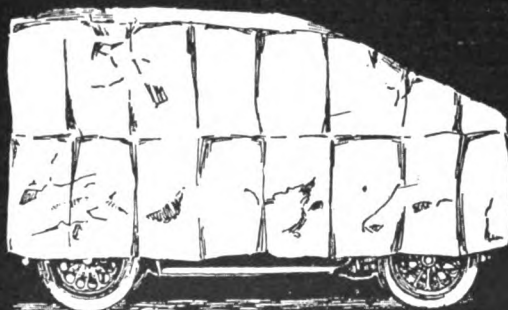
Customers will be glad to have their cars protected, the varnish unharmed, the life of tires preserved.

Start using Kennedy covers in your establishment, now. Sell them to car owners who have their private garage. The field for the sale of these covers is as wide as the automobile trade itself. Write for details.

THE KENNEDY CAR LINER AND BAG CO.

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The Spool Fits the Hand

See how naturally the spool of Kester Acid-Core Wire Solder slips into the curve of the hand. No cramped fingers in holding it. The operator is "at ease" to watch the solder flow in its usual way—smoothly and evenly—with a perfect soldering job as its ultimate goal.



The little free sample coupon below will be your admission ticket to excellent soldering. Fill it in now.

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Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder.

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Our Supply House is

Lubricating the Ball Bearings.

Does a ball bearing require lubrication? As the motion is rolling and, theoretically, there is no sliding, lubrication should not be required.—O. W. W., Cal.

Yes. Lubrication probably serves more as a protection to the balls and races from rust and corrosion than as a lubricant in the ordinary sense of the word.

There is sliding where the balls touch the containers and wear would be caused if they are not properly lubricated.

* * *

Mixture Too Lean.

Will you write me how I can get the gas or spark knock out of some 490 Chevrolet cars? I have had the valves, timing, carburetor and pistons checked and find them to be O. K.?

I have tried two cylinder-head gaskets with no results. It seems that everything has been done but maybe you can show me a way out of it. I hope so.—E. S., N. Y.

The Chevrolet engine is of rather high compression, and has a very compact compression chamber, so that it will knock easily, but it will prove very efficient if properly adjusted.

Carbon, or too great an advance of the spark, will cause a knock. If you are absolutely sure about these two items, look to the carburetor for the trouble. The mixture is evidently too lean. If this is the case, the knock can be made to disappear by choking the carburetor slightly. Probably a slightly larger main jet will do the trick and also give a bit more power on a stiff pull.

* * *

Water Boiling in Maccar Truck.

Will you kindly give me your idea of what makes the water boil in a Maccar truck, made in Scranton, Pa.? This is a model J 1917 car.

I have just had the carbon taken out and the valves ground. The timing is not too low and is as high as I can put it and have the engine making good compression. The radiator is not blocked up. The pump works good, but the engine will make the water boil running along a level road on high. Is it the age of the engine that does it? The truck has been worked hard in its time.

I also have the carburetor adjusted as keen as can be—not too much gas, nor is it too lean.—G. W., Pa.

Try washing out the cooling system by adding ¼-can of lye when the radiator is full and hot.

Drive the truck, or at least keep the engine running for about three hours, and then drain and flush out several times

Now It's Your Turn.

In answering these queries concerning the difficulties arising in garage work, we have given the generally approved methods.

But we realize that many of our readers will have a different way of "doing the trick," and can offer interesting and helpful suggestions from a different angle. So we would like to have you tell us whenever you have a different method for handling these various questions.

Let's make this a Round Table for the exchange of ideas and thus be mutually helpful!

with clean water. As this will probably injure the hose connections, they should be renewed.

Make sure that the spark is as far advanced as it will run without causing a knock, that the carburetor is correctly adjusted and that the compression is good on all cylinders. We are assuming that the lubrication system is working and that you are using good oil and changing it often.

The age of the truck should not cause heating if it runs freely and the foregoing conditions are met with.

* * *

Wiring of Jackson 1917-18 Car.

Please publish the wiring diagram of a Jackson eight with a Wolverine motor, and tell me how the motor fires.

Also, this motor has bronze connecting bearings and main bearings. Please tell me about how tight they should be taken up, as I have never had any experience with bronze bearings in a high speed motor.—R. M., Iowa.

We are publishing the wiring diagram for the Jackson 1917-18, model 349 car, in this issue. It is our opinion that the distributor rotates clockwise, looking at it from above, so, checking from the wiring diagram, the firing order would be 1-8-3-6-4-5-2-7. If

the rotation is opposite in this particular instance, the firing order would be 1-7-2-5-4-6-3-8.

Bronze bearings should never be fitted too tightly. About 0.001-inch should be allowed as clearance for an oil film. The clearance should be checked during a complete revolution, as a slightly out-of-round crank pin might cause the bearing to bind at some position.

* * *

Boat Designing.

Kindly advise me how to design my boat. I would like one to carry seven or eight persons. I am planning to use a Ford car engine and would like to make it as fast as possible. How would sheet iron on angle iron be? Could you suggest a cooling system?—A. E. F., Canada.

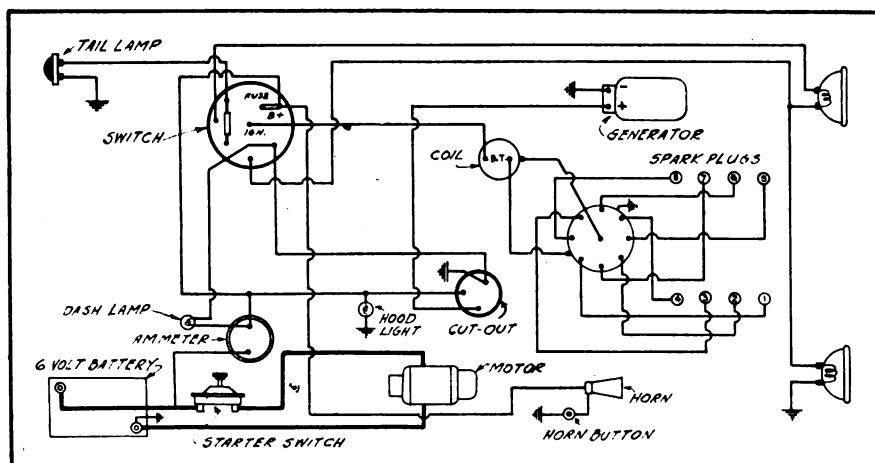
Boat designing is a very highly skilled job, as the slightest differences in hull outline will make big differences in speed. We would suggest that you buy a knocked down boat or at least the blue print of one, as this will give you a design that has been tried and will assure you of success on your first attempt. The blue prints cost but little and will save enough time to pay for themselves several times on a single job. You will find advertisements of concerns selling such designs in any boat magazine.

We would suggest a boat about 22 feet long by 5-foot beam and 1-foot draft. The engine should be mounted well forward and may be cranked by a rod mounted above the engine, which has a crank on the rear end and a chain and sprocket which will hook to the front end of the end of the crankshaft.

Mount the engine so it will be level when the boat is under way, as this will enable the lubrication system to work properly under the heavy working conditions. A pump should be mounted so water will be pumped through the engine and discharged overboard.

A suction line should be brought up above the engine so it will remain full of water when not in use. A valve will enable you to control the flow of water and thus regulate the cooling. The engine should not be operated at too high a speed if you expect long life and good service. Probably 700 to 900 revolutions per minute will be fast enough.

A propeller having a diameter of about 15 inches and three blades, and a pitch of about 22 inches, will be about right. However, you should get the advice of the firm that builds your propeller as this part of the work is important.



Wiring Diagram Showing Firing Order of Engine, Jackson 1917-18 Car.

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(Patent Pending)

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Bushings On All
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THE new features have created an instant demand for this mechanically perfect boring and reaming tool.

A slight turn of screw in end affords even, accurate expansion. Easy to micrometer.

The Self Cutting Pilot does rough cutting leaving Reamer proper to do finish reaming only. Holes are reamed in perfect alignment as front pilot guides for beginning and rear pilot for ending of reaming.

Left hand spiral flutes cut easily and smoothly with a shearing motion leaving a full bearing surface with mirror-like finish.

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"The P.S.M. Electric Tube Plate completely eliminates the trouble, inconvenience and expense of steam vulcanizing.

"The heat is developed entirely by electricity. This means no expensive steam boiler to buy, no steam pipes to install, no pipes to burst in the Winter or make you uncomfortable in the Summer.

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"Just connect the cord and plug, turn on the switch and you will have vulcanizing heat in ten minutes. The Patented Thermo Switch holds the heat at the correct temperature and absolutely prevents burning.

"Our 9 x 5 inch size with one C clamp, cord and plug, sells for \$25.00 and pays for itself before you know it. Our 24 x 5 size, with four spring clamps, cord and plug, sells for \$45.00. With the big one you can vulcanize four tubes at the same time because the heat is evenly distributed over the entire surface of the plate.

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The many advantages of Progressive Electric vulcanizers over steam outfits are fully explained in the P. S. M. complete catalog.

Write today for your copy.

Letters of An "Oldtimer" to Beginner

(Continued from page 40.)

tractors. That might be a source of some good business for you.

Another thing you want to be sure to do is to keep an accurate record of your stock of parts—you've simply got to, Bob. The failure to keep such a record has cost many a garageman a greater profit loss than he generally realizes.

This record will help you to estimate closely just how large a stock of the various parts you will need in order to be ready for any calls that may be made for replacement parts, and yet not be overstocked on some and understocked on others.

The easiest way in the world to lose a customer's good-will is to keep his car tied up for weeks in your shop, waiting for parts that ought to be in stock but aren't.

While we're talking parts, I want to warn you against buying any but manufacturers' parts. Never buy "pirate parts," no matter how tempting the offer may be.

I know one fellow who got an idea, because he could get a lot of these "pirate parts" cheaper than he could the genuine, that he had a sure way of putting one over on the other garagemen in town. He tried it—and went broke two years later.

As soon as you can do so, you will do well to figure out a flat rate list for service charges. This will mean better satisfied customers, and will also help you to arrive at a knowledge of what is a fair profit for you—and that's something you've got to know if you're going to make a go of your business. Later on, if you wish, I'll write you about some of my experiences and some of the things I've learned about flat rate systems that may help you in doling out your own rate list.

You got me started on a big subject, boy, when you asked me to give you some pointers on getting your garage business going. I've been in the game for so long that it's about all I can talk about and when

I get started I don't know when to stop.

But it may be that my experience will help you to dodge some of the bad places along the road, and so if you want any more tips, just say so. Your dad did me more than one good turn when I was opening my first shop, and you can bet his son will get all the help I know how to give.

Yours for success,
JOHN EVANS.

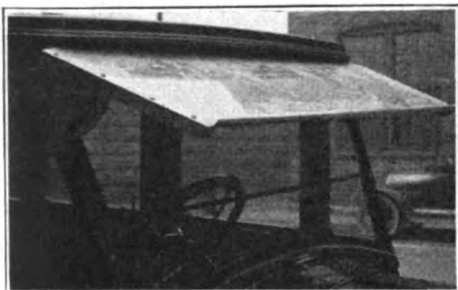
138,000 Cars and Trucks on Pennsylvania Farms.

Farmers of Pennsylvania own 138,000 cars and trucks, according to a survey of the Department of Agriculture of that state. This is an increase of 61 per cent since the U. S. Department of Agriculture census in 1919. The motor truck total is now 17,000 or nearly double the farm truck registration of Pennsylvania in 1919.

Accessories—Dealers' Key to Profits

Something New and Distinctive in Automobile Visors.

Once again the constructive genius of a practical automotive man has presented to the motoring public a new accessory that.



No Confusing Reflections From Different Lights With Rain-R-Shine Visor.

because of the added comfort, safety and economy in the operation of the car which it affords, will surely receive an enthusiastic welcome.

This is the new "Rain-R-Shine" aluminum visor which has been perfected by the International Stamping Co., of Chicago, and which was designed by W. R. Green, president of the company. The manufacturer states that, so far as is known, the International Stamping Co. is the pioneer manufacturer of aluminum visors.

One of the advantageous features to be noted about the aluminum visor is that the car driver is not annoyed and confused by the many reflections from different lights—

the driver behind a "Rain-R-Shine" visor is cool and free and always has a clear view of the road ahead regardless of weather conditions.

Aluminum was chosen for the construction of this visor for the further reasons that it would assure light weight and rigidity and lend itself to better design—the increased width and true shield form making for an attractive appearance and greater protection. It also adds stiffness to the construction, thus giving assurance against vibration. Further, it avoids the danger from glass breakage.

Because it keeps rain, snow and sleet away from the wind-shield of the car, the "Rain-R-Shine" visor makes car driving safer in bad weather—a feature that will be appreciated by every motorist.

Every "Rain-R-Shine" visor is finished in black enamel, baked on at 450 degrees and the under side is finished in flat green—giving a neat and attractive appearance.

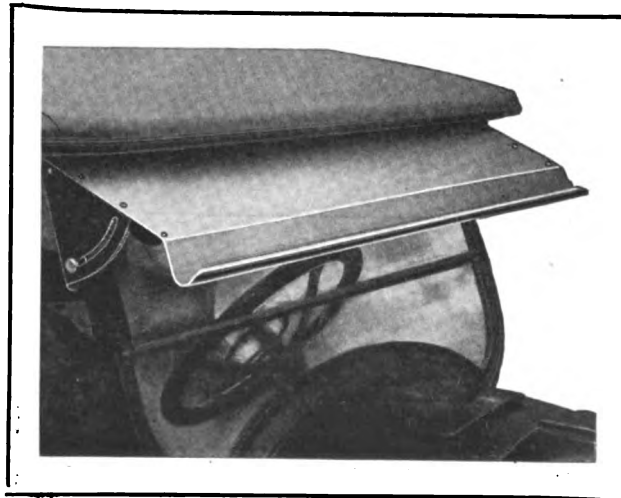
The attaching brackets permit the shield to be adjusted to any angle desired, but this is only one feature of adjustability. The more important is the wide range of adjustment of the shield to the at-

taching brackets, which permits of one length visor—48 inches—being properly mounted on any car varying in width from 37 inches to 45 inches.

"Rain-R-Shine" visors are absolutely rustproof and there is no fabric to tear or whip out of shape.

Of particular interest to dealers will be the fact that it is really only necessary to carry two models of these visors in stock, as this will take care of the average calls for visors.

The first of these is designated as "Stock Model T. No. 1" and is intended for all open cars having round or oval windshield posts having a spread of 37 inches to 44



"Rain-R-Shine" Aluminum Visor for Open Cars.

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Also combined in one large loose-leaf volume with Wells' Auto-Electricians' Handbook if desired. This one volume gives all available data covering both external and internal wiring, together with test and performance on every make and model (over 850) of generator, motor, regulator, cutout, etc. Price \$22.50 delivered.

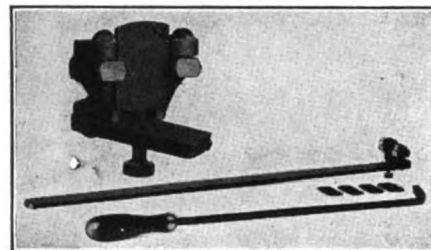
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Automotive Publishing Company

448 So. Dearborn Street, CHICAGO

BIG PROFITS IN REPAIRING SCORED CYLINDERS

No secret or mystery with the TORIT process



TORIT SCORED CYLINDER TOOLS

(Adjustable blade holder magnified)

TORIT tools refinish the cylinder to the same bore and surface. No new pistons, no regrinding. Easy work, big pay. Get your outfit now.

Price of tools, as shown, with instructions.....\$10.00
Filling-in metal, per pound..... 3.50

ST. PAUL WELDING & MFG. CO. 165 W. 3rd St., St. Paul, Minn.

Mfrs. TORIT torches, generators, preheaters, etc.
Distributors REGO oxy-acetylene equipment.

Do You Still Remove Gas and Oil Lines to Clean Them?

Save that time and trouble. Get a "Bird" and you won't have to remove a pipe from the car. This flexible cleaner will follow all bends. Just push it in one end and keep on pushing until you see the obstructions crawling out the other end. When the Bird cleaner has finished its work, the pipe will be absolutely clean of all hard and soft deposits.

BIRD FLEXIBLE CLEANER

GARAGE SPECIAL—Ten feet long, for long pipes on large cars **\$1.00**

SPECIAL FOR FORDS—Thirty inches long, specially planned for Ford oil pipe **50c**

See the coupon below! Fill it in without delay. Then you will be splendidly equipped to clean the oil pipe of a Ford or the gas line of any large car—quickly and well.

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BIRD MFG. CO.,

Marshalltown, Iowa.

Send me the following:

..... No. 1 Special for Fords

..... No. 2 Garage Special

Name

Address

City

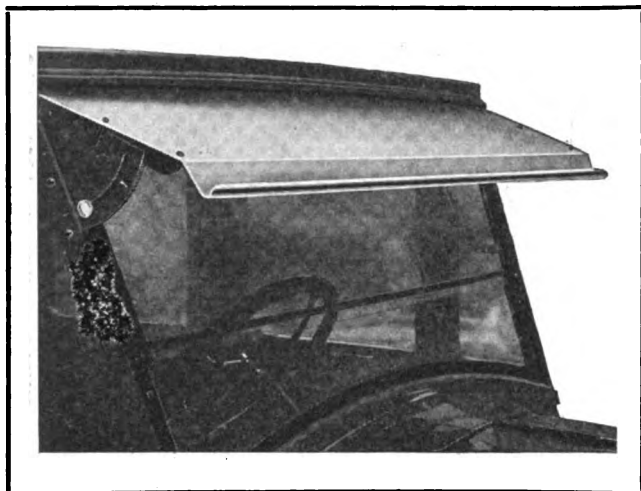
State

Ship through

(Initials)

inches. This model will fit 80 per cent of the open cars, such as Buick, Dodge, Studebaker and many others.

The second is known as "Stock Model C. No. 1" (48 inches) and is designed for



"Rain-R-Shine" Aluminum Visor for Closed Cars.

straight-front closed cars having a width of 39 inches to 46 inches. This model fits 80 per cent of the closed cars.

There are, however, several other models which can be had. For instance:

Special Model W.K.C. (46 inches) for Willys-Knight closed cars.

Special Model O.C. (41 inches) for Overland closed cars.

This manufacturer also carries a line of all-steel visors for open and closed cars.

A request addressed to The International Stamping Co., 400 North Leavitt Street, Chicago, will promptly bring you such further details as you may wish concerning these visors, prices, etc.

Metal Stamping Co. Perfects New Bumper for Light Automobile.

The Metal Stamping Co., Long Island City, N. Y., announces that it will exhibit at both the New York and Chicago automobile shows as well as at the S. A. E. exhibition in the latter city.

Not only will the Lyon straight bar, convex, and Dreadnaught bumpers be shown, but also the Vanguard, which is soon to be placed on the market.

The Vanguard is a distinctly individual design with graceful lines, intended for the light automobile. It has a broadened bumping surface—both upward and downward—which affords maximum protection, while its extremely simple, patented, two-piece construction allows for ample adjustment.

It is made only of 2-inch width steel, in either Japan or nickel finish, and may be easily attached with any Lyon standard fittings. The bumper is built in two sizes—Model "A" for cars having a frame width of from 25¼ to 28¼ ins., and model "B" 28¼ to 31¼ ins.

A new universal fitting will also be exhibited. This fitting makes the newest, broad-faced designs of Lyon bumpers adjustable and adaptable to practically all cars.

Manufacturers of General Piston Rings Announce Change in Name.

The General Piston Ring Co., known until now as the Teetor Mfg. Co., has been making piston rings for motor builders for the past 12 years. The officers of the company have relatives at Hagerstown, Ind., who also manufacture high-grade piston rings, under the firm name of the Indiana Piston Ring Co., making the "Teetor" ring.

Because of the fact that the firm name of the manufacturers of the General piston rings has previously been the Teetor Mfg. Co., and the rings made by the Indiana Piston Co. have been known as "Teetor" rings, there has been some confusion in the mind of the trade. Therefore, the name of the manufacturers of the General piston rings will be known hereafter as the General Piston Ring Co.

The Most Stubborn "Frozen-Up" Engine Yields to B-L Vaporizer.

Now that cold weather is approaching, and dealers are preparing to launch their selling campaigns on the accessories that the car owner will need in order to have his car properly equipped for winter driving, the B-L petrolizer is an item which will at once recommend itself to them because of the many desirable features which are possessed by it.

Even though the car is equipped with the best of starting devices, the motorist is likely to waste many minutes on cold days trying to get the motor started. The B-L hot gas petrolizer is said to offer a complete solution for "under the hood" troubles in cold weather, as well as saving battery wear, motor racking and waste of time and patience.

Briefly, the B-L vaporizer conducts cold gasoline in liquid form from the gasoline

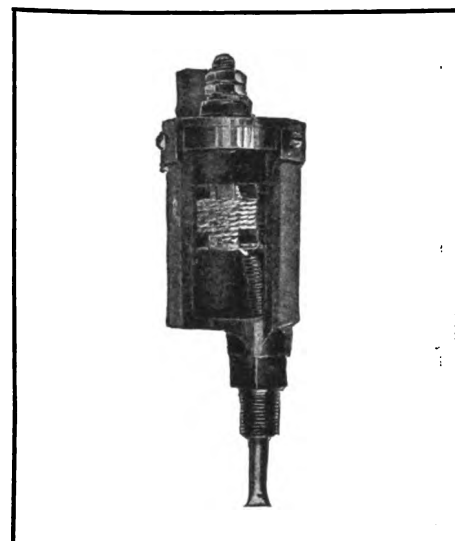
line or vacuum system—entirely independent of the carbureter—heats it by means of an electric resistance coil to a temperature of 600 degrees or more, and then immediately shoots it, in the form of superheated vapor, into the intake manifold.

The B-L hot gas petrolizer does not depend upon the engine suction, but has a positive pressure injector—hot gasolene vapor is forced into the intake manifold regardless of whether the motor is turning over or not.

The entire operation is controlled from the driver's seat and embodies only the throwing of a switch on the dash and then giving the plunger a pull out and a push back. A touch of the starter button will then start the motor with all the ease that characterizes the starting of the car on a summer day.

Other claims made for the B-L petrolizer are:

That it works entirely independent of the carbureter—not in any way affecting its

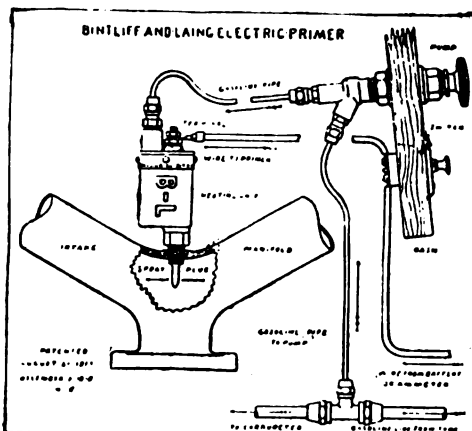


Hot Gas Vaporizer Offers Complete Solution for "Under the Hood" Troubles.

adjustment; that it warms up the motor on hot, thoroughly vaporized gasolene in one-tenth the time required by cold gasolene; that it increases mileage at least 20 per cent because the carbureter can be adjusted to a finer point, equivalent to a summer adjustment; that the life of the battery is doubled; that it eliminates priming through pet-cocks and destroying oil film on the cylinder wall, as well as thinning of crankcase oil; that the waste of fuel involved in warming up a cold motor with cold gasolene is eliminated; that it eliminates stalling the motor and flooding the carbureter; and that it avoids the danger from fire by a pop-back through a flooded carbureter.

The B-L petrolizer is very easily installed, and is sold by the manufacturer with a money-back guarantee of satisfaction.

Write the Auto Distributing Co., 410-416 Sycamore St., Plainfield, N. J., for descriptive literature and full particulars.



Showing Method of Installation of B-L Hot Gas Vaporizer.

The Best Way We Know How To Tell And Prove It To You.

August 28th, 1922.

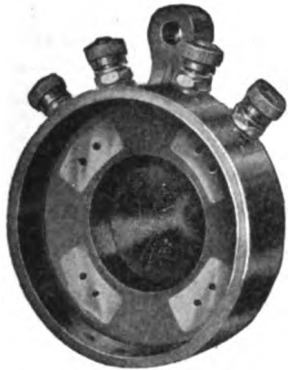
Gentlemen:—

I have used your BLU-BLAZE TIMER on my Ford Coupe this season and so far have driven nearly ten thousand miles without one bit of Timer trouble. While last year I drove fifteen thousand miles and used six Timers of other makes. I am satisfied that your Timer is a wonderful one, and am desirous of handling same exclusively. I am on the road and have been for twenty years. I would like to get a protected territory on your Timer, Minnesota, Wisconsin and Michigan preferred, but will take anything you will give me. If you cannot or do not do this, please give me your prices in quantity lots, say in one dozen lots, fifty lots, one hundred lots and also in five hundred lots.

Yours truly,

O. J. La B.
Iron River, Michigan.

Below — The simple rotor, showing copper-carbon brush.



The Condensite shell, showing polished raceway and contacts.

LIST PRICE

In the East.....\$3.00
In the West.....\$3.50

Other similar letters received daily. Originals on file with us.

Dealers: Users are the best advertisers of "BLU-BLAZE TIMERS." Ask us about sales possibilities.

Blublaze Motor Specialties Corporation

Factory: 43 Seventh Ave.,
Long Island City, N. Y.

SKINNER

MOTOR VALVE SETS

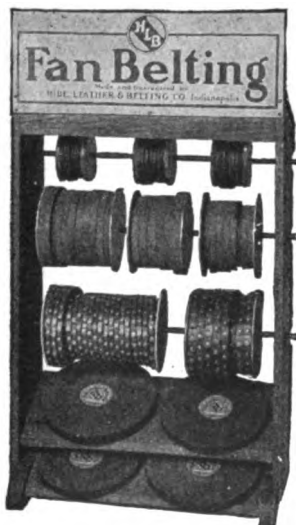


This new filing-refacer with its accurate guide bearing—its file held to a true plane—puts a true seating surface on even a warped tungsten valve. Set also includes complete reseater—shear cutter taking $1\frac{1}{8}$ " to $3\frac{1}{8}$ " valve seats, and four pilots. Skinner cutters stay sharp. Send for free treatise on valve work.

Grinder
Accuracy at
a Hand-tool
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Automotive Products



Our "Junior" and "Senior" Fan Belt Racks are especially popular and profitable for dealers everywhere (see illustration of "Senior" Rack at left). Our complete line also includes—

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Sold by leading dealers everywhere. Ask your jobber for full information or write today for our complete catalog and discounts.

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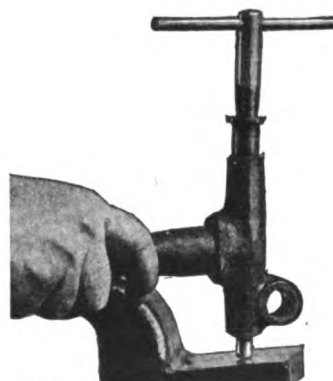
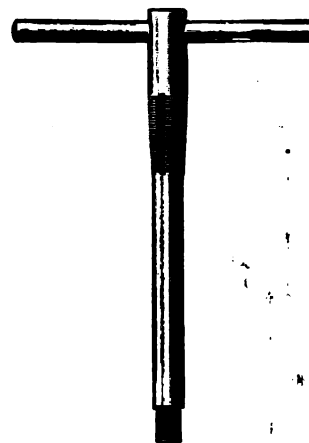
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NEW YORK

For those bushings in those hard places, use

The Holly Bushing Extractor

It will most assuredly get them out. Extracts sizes ranging from $\frac{3}{8}$ " to $2\frac{5}{16}$ ".

Leading motor manufacturers use the Holly and recommend it. You can secure the tools singly or in sets.

No. 1 Holly Extracts Bushings from $\frac{1}{2}$ " to $9\frac{1}{16}$ "

Standard set (Nos. 0, 1, 2, 3, 4 and 34E tools)\$18.40

Combination set (No. 579 tool extracts bushings from $1\frac{1}{16}$ to $2\frac{5}{16}$ " inclusive).....\$10.00

Special Ford Set (Nos. 1, 2, 3, 4 and 79 tools, extracts all bushings in Ford cars and trucks)\$20.00

If your jobber cannot supply you, order direct from

The Rosier-Howard Corporation

307 National,
Hutchinson, Kansas

Interesting Exhibits A.E.A. Week at Congress Hotel, Chicago.

Many new features of interest, to promote better merchandising of B-N piston pins, have been worked out and were exhibited for the first time by the Burgess-Norton Mfg. Co., at the Congress hotel, Chicago, during the Automotive Equipment Association show and convention, November 11 to 18.

The entire Burgess-Norton sales force occupied a suite of rooms at the Congress hotel, where they entertained their friends and customers and explained the new advertising and sales promotion ideas and exhibited the new service station signs, etc., which will be used during the coming season.

Make Sure the Battery Is Right—With a Hafner Hydrometer.

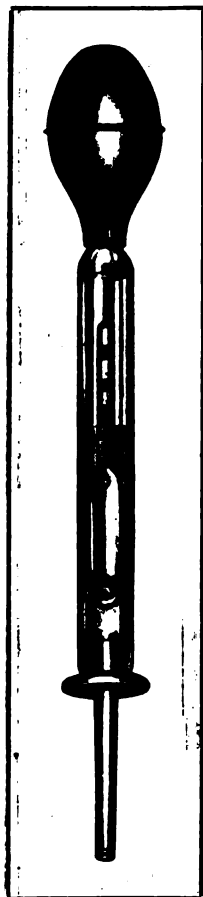
It is sturdy, it is accurate, and it will enable you to tell at a glance whether the battery is empty, half-charged or full—these

are some of the valuable features attributed to the Hafner hydrometer.

The Hafner hydrometer has a heavy, one-diameter barrel, which is easy to read and hard to injure. It is always easy to get a correct reading, for the float cannot be held against the barrel by capillary attraction. Glass beads on the float keep it always floating freely.

Soft, acid-proof stock has been used in the construction of the rubber connections, thus protecting the hydrometer from breakage and preventing loss of suction and leakage of acid.

Your radio owner customers will be delighted with the Hafner hydrometer, for it will enable them to remedy the battery trouble before the expensive plates are ruined, and will give them more efficient



Hafner Hydrometer
Is Sturdy and
Accurate.

operation of the radio outfit. An unbalanced battery, with cells of varying efficiency, can cause a considerable amount of radio trouble. With a Hafner hydrometer, the battery can be easily and accurately tested frequently.

The price at which this hydrometer is being offered is a most attractive one. Write

the Hafner Mfg. Co., 3128 Carroll Ave., Chicago, for further particulars.

"Not an Accessory—A Necessity," Say Repairmen of Bird Cleaner.

Garagemen say of the Bird flexible cleaner that it is "a bird in action" as well as in name.

This handy tool is designed for removing sediment without removing the small pipes from the car, these being, as a rule, fastened to the body or frame of the car. Thus much time and labor are saved.

The Bird flexible cleaner follows all bends. All that is necessary is to insert the cleaner in one end of the pipe and keep on pushing until you see the obstructions crawling out at the other end of the pipe.

It is made in two sizes—the "Ford Special" for Ford cars and the "Garage Special" for all cars.

The "Ford Special," which is 30 inches long, can be used either from the front or the rear of the car. By removing the transmission cover, the cleaner can be inserted over the flywheel into the funnel of the oil pipe. By removing the radiator and timer gear cover the same operation can be performed, thus cleaning all particles of metal or lint from the oil line, which gather from constant wear of bearings and transmission brake bands.

The "Garage Special," which is made ten feet in length, is intended for oil and gas lines on all makes of cars.

Bird flexible cleaners are sold at a most attractive price, and their construction is such that they will last for years.

Write the Bird Mfg. Co., Marshalltown, Iowa, for descriptive literature and full particulars.

Presto Electric Heater Prevents Frozen Radiators and Bursted Pipes.

This new Presto No. 2200 automobile engine and radiator heater is round, 2 inches in diameter and 11 inches long—a very convenient size to be used under the hood of a car, as it may be placed under the fan near the bottom part of the radiator, where the water gets cold first.

The construction throughout is absolutely fireproof and practically indestructible. The core is made of porcelain, with grooves molded in for the wire, so that they cannot become displaced, all covered with heavy perforated metal, black japanned, to prevent rust, and with nickel-plated ends.

Ten feet of asbestos-covered lamp cord is furnished with each heater, with a regular screw plug attached to fit all ordinary house or garage lighting sockets. The handle is made of heavy wire, wound into an open spiral form and insulated from the heating elements, so that it is always cool and easily handled.

All the user has to do is to screw the plug into the nearest light socket, put the

heater under the hood close to the engine or radiator, and go to bed—assured of the fact that when he goes to the garage in the morning he will find the engine warm and starting a pleasure, says the manufacturer. It gives a strong, uniform heat, but there is no danger of fire, as it is stated that the



Presto Electric Heater Prevents Frozen Radiator.

heating elements never become hot enough to ignite any gases, oil or grease.

As a large percentage of the automobiles owned today are kept in private garages, which are cold in the winter, there is a great risk of frozen radiators and bursted pipes, unless some adequate device is used for keeping the water in the radiator from freezing. The use of this electric heater is cheaper than heating the entire garage, and is very clean and always handy and ready for use.

Further details can be obtained by writing the Metal Specialties Mfg. Co., 338-352 North Kedzie Ave., Chicago, which manufactures the Presto automobile engine and radiator heater.

Book Review.

MOTOR VEHICLES AND THEIR ENGINES, by Edward S. Fraser and Ralph B. Jones. Published by D. Van Nostrand Co., 8 Warren St., New York, N. Y. 374 pages, profusely illustrated, 5¼ ins. by 9 ins.; price \$2. Second edition.

The joint authors of this book were formerly instructors in the motor transportation course in the U. S. Coast Artillery school, and this book is the outgrowth of the authors' former volume, "Transportation for Heavy Artillery," which was prepared for use as a text-book in the coast artillery school's course in the subject. The valuable experience gained in connection with their work as instructors in that school has been embodied in this second edition of "Motor Vehicles and Their Engines," with a view of presenting a treatise which will contain all the information necessary to properly operate and care for motor vehicles.

Old material has been thoroughly modernized and much new matter descriptive of mechanical improvements developed since 1920 has been included. Many chapters have been entirely rewritten, a large number of new illustrations have been added and descriptions of a number of obsolete types of machinery eliminated. The few discussions of comparatively obsolete devices that have been retained are given as

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When you need a Doctor Do you get estimates?

NO! you engage a Physician in whom you have confidence. That's why you use F.A.A. ALUMINUM and CAST IRON MENDS. You have confidence in them in making permanent repairs, such as scored cylinders, cracked water jackets and aluminum castings.

**F. A. A. Aluminum and Cast Iron
Mends go straight to the job.**

**Distributors—Dealers—Agents
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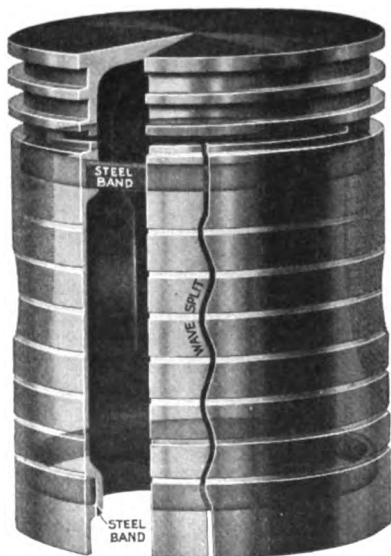
2640-42 Fond du Lac Ave., Milwaukee, Wis.

Western Distributor
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THE PISTON YOU HAVE HOPED FOR The BU-NITE Steel Band Piston

A Thermostatically controlled piston, safeguarding the running condition of an engine.

You will want to add the piston the automobile trade has been demanding.



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BUTLER MANUFACTURING COMPANY

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Sentry

Guards Engine Efficiency

Auto Owners everywhere buy the Sentry on sight. Because this device guards motor efficiency by condensing vapors or anti-freeze solutions back into liquids keeping water supply constant—thus preventing overheating. It also warns of low water, etc. If first warning is not heeded, Sentry whistles until trouble is remedied.

Neat and attractive—no delicate parts—no glass to break—no wiring or complex parts to get out of order. Price \$8.50. Every car owner is a prospect. Some one will sell them in your territory. Will it be you? Write now for complete description.

Alert Alarm Company
607 N. La Salle St.
Chicago



BLACK AND WHITE Valve Grinding Compound!

Black & White CUTS!

It's the fastest-cutting, smoothest-working GOOD valve-grinding compound you have ever used.

LIGHT PRESSURE, MIGHTY QUICK CUT

Finishes valve seats in half the time—smooth as silk—and never leaves a ridge.

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a guide to theory rather than to practice.

The following chapter titles will give a fairly adequate idea of the instructive value and scope of this book:

The Gas Engine; Principles of Two- and Four-Cycle Engines; Timing; Engine Balance and Firing Order; Cooling Systems; Fuel Feed Systems; Fuels; Elements of Carburetion; Carbureters; Puddle Type Carbureters;

Magnetism; Elementary Electricity; Batteries; Induction; Battery Ignition Systems; Magnetos: Armature Type; Magnetos: Rotor Type; Dual and Duplex Ignition Systems; Starting and Lighting Systems;

Power Transmission; Clutches; Transmissions; Drives; Differentials; Running Gear; Tires and Rims; How to Drive; Engine Troubles Experienced on the Road; Lubrication; Care and Adjustment; and Care and Adjustment Tables.

So clearly has the text-matter in this volume been presented, and so complete and detailed are the illustrations and drawings used, that its value as a guide for the personal instruction of the car owner is obvious. As a handbook for chauffeurs, garages and repairmen and as a text-book for

automobile schools, it will be found equally desirable.

Address inquiries concerning this book to D. Van Nostrand Co., 8 Warren St., N. Y.

Statement of Ownership of "American Garage & Auto Dealer."

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of American Garage & Auto Dealer, published monthly at Chicago, Ill., for Oct. 1, 1922.

State of Illinois, County of Cook, ss.—Before me, a notary public in and for the state and county aforesaid, personally appeared S. R. Edwards, who, having been duly sworn according to law, deposes and says that he is the editor of American Garage & Auto Dealer and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, embodied in section 443, postal laws and regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher — American Garage & Auto Dealer, Inc., 116 S. Michigan Ave., Chicago.

Editor—S. R. Edwards, 116 S. Michigan Ave., Chicago.

Managing Editor—S. R. Edwards, 116 S. Michigan Ave., Chicago.

Business Manager—J. R. Hastie, 116 S. Michigan Ave., Chicago.

2. That the owners are: (Give names and addresses of individual owners, or, if a cor-

poration, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)—H. D. Fargo, 116 S. Michigan Ave., Chicago; J. R. Hastie, 116 S. Michigan Ave., Chicago; S. R. Edwards, 116 S. Michigan Ave., Chicago; I. B. Lipson, Fort Dearborn Bldg., Chicago; R. S. Clissold, 327 S. La Salle St., Chicago; J. W. Hastie, 3325 Washington Blvd., Chicago; E. C. Hole, 431 S. Dearborn St., Chicago; S. G. Levy, Fort Dearborn Bldg., Chicago; E. T. Clissold, 327 S. La Salle St., Chicago.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.)—None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

S. R. EDWARDS,

Editor.

Sworn to and subscribed before me this 28th day of September, 1922.

(Seal)

D. O. Merryman.

(My commission expires April 30, 1925.)

Up-to-the-Minute Garage Equipment

Quick Service, Cleanliness and Convenience Assured by Battle Pump.

There is frequently a considerable waste involved in the handling of lubricants or non-lubricants in barrels and tanks, through leakage from faucets.

This is a wastage which the Battle double-acting, two-way pump is designed to eliminate, as well as affording convenience and a saving of labor in the handling of barrels.

The Battle pump is unique in construction, operating either forward or backward, thus making it possible to transfer to or from the barrel or tank. It has a capacity sufficient to transfer a barrel of oil in less than ten minutes, and is quick for serving small quantities when pumping direct from the shipping barrel.

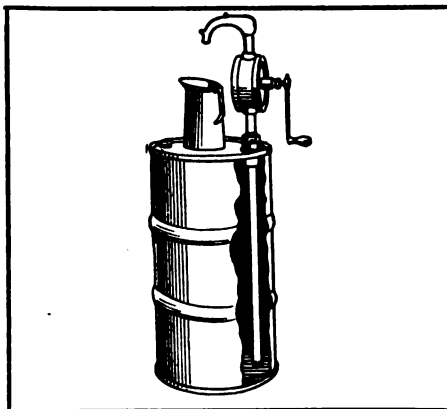
There are only four all-metal working parts, which are machined with accuracy, thus eliminating friction and reducing the possibilities of the pump getting out of order to a minimum.

A Battle pump can be attached to a barrel in less than five minutes, simply by up-ending the barrel, removing the plug, screwing in the bung sleeve, inserting the suction pipe to the bottom of the barrel, and tightening the set-screw. It will pump either light or heavy fluids that will flow through a one-inch suction pipe.

There are no gears, springs, wings, buckets nor leather or composition valves,

and it is a pump that no reasonable service will put out of commission. It has a capacity of from one pint to ten gallons per minute. The nozzle being threaded to attach a one-inch hose coupling provides for a direct flow for handling heavy fluids and, having a large volume, the Battle pump is ideal for transferring purposes.

Service stations and garages find a Battle pump exceptionally convenient because



Battle Pump is Unique in Construction.

of the pump attached to the barrel being leak-proof when exposed to the elements of the weather. Thus it is possible to place the barrel at the curb, or wherever it is most convenient to serve the trade, and to deliver the oil clean as coming from the barrel.

It is also most convenient for the automobile and truck owners who buy oils and gasoline in returnable barrels, "pumping direct from the shipping barrel to the machine."

The manufacturer guarantees all Battle pumps as to workmanship and material, and they are sold on very attractive terms.

Those interested should write the Mechanical Devices Co., Dept. 7, Aurora, Ill., for particulars concerning prices and discounts.

"Giant" in Name and Deed Is This Rim Spreader.

The "stubborn" tire rim is a nuisance that every repairman has met—the kind, you know, that you work and work with, and the longer you work and the hotter and madder you get, the harder it seems to put it back.

But you won't have to lose time and temper putting "obstinate" rims in place if you have a "4 Point Giant" rim spreader, for this is a tool which has been designed and perfected by the West Tire Setter Co., to do this work quickly and easily.

Even those rims that are all out of shape cannot resist the four bearing points of the "Giant" rim spreader, it is declared.

You will want to know more about this time and patience-saving tool—so write the West Tire Setter Co., at 255 Mill St., Rochester, N. Y., for full details.

SWAMPED WITH ORDERS



October swamped us and some delay in filling orders was unavoidable, but we will be able to ship day order is received in a short time.

**Production Increased
300 Per Cent**

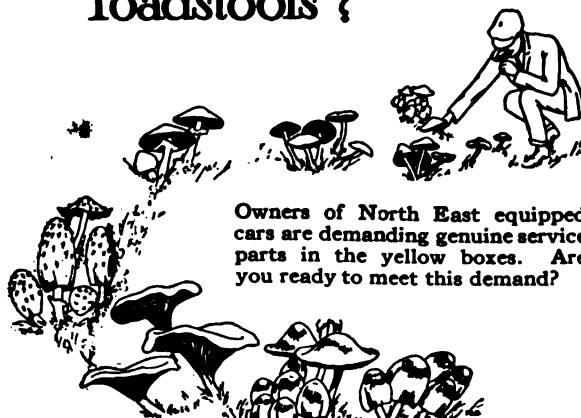
The demand for the long hot spark of the F R M Timer will be greater as cold weather continues. Get your order in today.

Retail Price
Complete

\$3.50

FRM Mfg. Co.
Fairbury, Illinois
Department B

Mushrooms or Toadstools?



Owners of North East equipped cars are demanding genuine service parts in the yellow boxes. Are you ready to meet this demand?

Genuine North East Service Parts are distributed to the trade by

NORTH EAST SERVICE INC.

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Detroit
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Official Service for
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**THE FRISZ
WHEEL
& GEAR
PULLER
NEVER
SLIPS**



*Made in
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of all size
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wheels*

Don't Waste Time and Lose Money

fussing with a wheel puller that grips poorly and slips.

Get the Frisz Wheel and Gear Puller. Its massive gripping fingers hold like a ship's anchor. They never slip and their grip is equally automatic, whether expanding or contracting. The drop forged, high carbon, nickel steel arms are always parallel with the power screw. This means a pull always in a straight pull—an easy pull.

Free from complicated parts. Needs no special attachments. Made of finest materials; heavily reinforced where stresses come heaviest.

Get the Frisz Wheel and Gear Puller from your jobber—today.

JOBBER—Write for our interesting proposition.

FRISZ MFG. CO.

1019 N. Capital Ave.

Indianapolis, Ind.

Battery Repair Men! Automotive Electrical Stations!

Suppose a specialist were to enter your shop and help you select instantly the right battery, magneto or ignition part necessary to handle every job;

—and he also showed you the most economical way to buy Battery and Electrical testing and repair equipment: the kind that insures quick and skillful results;

—and his wealth of information included every tool and Replacement part that finds its way into a modern battery or electrical service station like yours;

—would you like to have his services—FREE?

Our new 138 page catalog is just such an expert—a helper that points a finger to the exact solution of every equipment or parts problem.

A copy will be forwarded on request, FREE—WRITE NOW!

W. F. PRICE BATTERY SUPPLY CO., Inc.
3300 N. Broad Street. Philadelphia, Penna.

Stormizing—A New Process for Refinishing Motor Cylinders.

The Storm Mfg. Co., Minneapolis, Minn., has developed a process of remachining or refinishing motor cylinders. It is a distinctive machining process—a method which is said to be entirely new and that differs materially from others ordinarily known as regrinding, reaming, reboring, honing or burnishing.

In order to distinguish the process from others it is being called "Stormizing," the name is being registered at the U. S. Patent Office. This process is the final result of extended experiments by the company along these lines.

Stormizing is especially designed and adapted to meet service work conditions. It gives the service shop the same or greater accuracy and a better finish than is ordinarily obtained in factory production and, like factory production, it consists of two distinct machining operations.

The first operation, the producing of the new accurate bore, is accomplished by the Storm multiple cutter heads. These heads remove the metal by a forward or downward cut in much the same manner as the heads used for boring cannon and for other work where extreme accuracy is required.

Each Storm cutter head has six universally adjusted cutters which divide the cut and equalize the cutting strain, and these heads, supported by the heavy hardened steel boring bar and substantial accurate bearings used on all Storm machines, make an extremely light cut possible. Only enough metal need be removed to true up the cylinders.

The second operation—that of producing the mirror working polish—is accomplished by the Storm self-centering polishing or finishing head, another exclusive patented feature of the Stormizing machines.

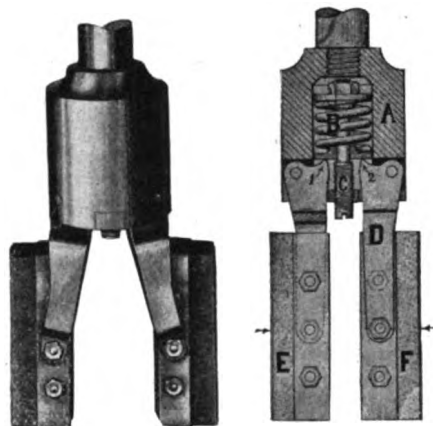
The principal features of this head are:

That it assures speed and efficiency in operation; that a perfect mirror working polish is produced; that it has a wide range of capacity; that a proper spring tension is provided for any and all diameters of cylinders; that it gives perfect balance of spring pressure and absolute centering.

The tool is of patented scientific construction and its action is novel and interesting.

So perfect, it is stated, is the construc-

tion and centering action of this tool that, in operation, the work and tool stand free with respect to each other—that is, they are not clamped or bolted together in any way. This centering action is said to be so strong that it will pull the heaviest type of block



Storm Cylinder Finishing Tool.

into perfect alignment, thus saving time by avoiding the necessity of clamping, and the tool may be operated at full speed without vibration.

The main body or chuck of the tool carries the heavy compression spring, which is held compressed between an upper and lower steel disk that is carried by the center adjusting arbor. The spring is compressed to about 110 pounds pressure.

From this lower steel disk, the spring pressure is transferred to the cams. When the tool is perfectly centered, this pressure is evenly divided—55 pounds to each of the two cams—but pressure is exerted on both cams only when the tool is perfectly centered. If the tool is ever so slightly off center, all the pressure—110 pounds—is immediately transferred to the one cam and

consequently against only one stone, the other arm hanging entirely free.

This construction acts as a balance and, when the tool is rotated, the block is drawn over by the pressure until both cams again ride against the disk. At this point, the pressure is equally divided and the work perfectly centered. No universal joints or other flexible means are employed. In fact, such parts would defeat the very purpose of the tool.

The tension spring, being normally compressed, there is no undue spread of the arms when not in use. The proper tension for varied diameters is quickly obtained simply by raising or lowering the spring mechanism within the chuck, by turning the center adjusting arbor.

The stones used are especially constructed for this purpose and are the result of careful experiments along this line.

A perfect mirror-like finish, of superior quality, is left by the tool, it is declared. While primarily intended for finishing after other machining operations, it can also be used—where the wear is only slight—for truing-up cylinders without previous machining operations.

Stormizing machines are supplied in three distinct types of models: A heavy duty stationary machine for the larger machine shops, a semi-portable machine, which is shown in one of the illustrations, for average shop requirements, and a lighter portable machine for lighter work.

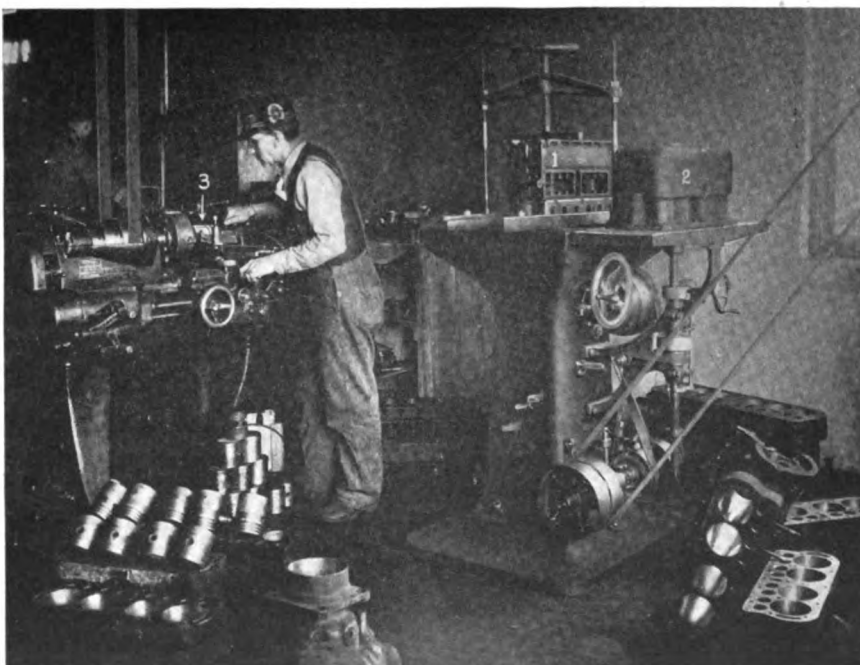
Complete information on cylinder Stormizing may be had by addressing Department E, Storm Mfg. Co., 406 6th Ave. South, Minneapolis, Minn.

Paragraphs.

R. G. HASKINS Co., manufacturers of flexible shaft equipments and portable tools, have moved to larger quarters, at 516 W. Monroe St., Chicago, which gives them large store space for the display and demonstration of their machines.

A display room will be maintained where machines can be tested out on a great variety of actual operations. The R. G. Haskins Co. will be glad to welcome visitors.

THE NORWALK IRON WORKS Co., pioneer builders of compressors, manufacturing air and gas compressors for all purposes and also refrigerating machinery, with general offices and works at South Norwalk, Conn., has just opened a Chicago office.



"He Does It All"—Three Operations at Once; (1) Machining One Cylinder Block; (2) Putting Working Polish on Another; (3) Fitting Pistons on the Third.

The Bruno Two Wire Timer

is a profit maker for any dealer. Read why!

This unique timer has but two wires and a single moving part. It is a product of modern inventive genius and, due to its scientific design, it incorporates certain features of ECONOMY, INCREASED POWER and DURABILITY that cannot be found in any other timer.

BAKELITE "SHORT PROOF" CASE

The case of Bakelite is short, rust, moisture and oil proof. The contacts are made of pure copper and the brushes are copper.

IT REQUIRES NO OIL



The BRUNO is in fact a "troubleless timer," no oil is required in its operation and the simple two wire construction eliminates the wires next to the fan belt. It will outlast any other timer made. It eliminates misfires, prevents the fouling of plugs and eliminates carbon caused by poor combustion.

\$4.00 DELIVERED ANYWHERE IN THE U. S. A.

On receipt of \$4.00 cash, check or money order, it will be sent you direct complete with wires, with all shipping charges prepaid.

STATE DISTRIBUTORS AND DEALERS WANTED

Write for full particulars of a highly profitable connection. This fast-selling accessory is nationally advertised.

THE BIGELOW BRUNO MFG. CO.

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"little giants of silence"

In the American Motorist of October these silencers are spoken of as "one of the simplest and most efficient automobile accessories." The silencer is moulded from one ounce of rubber into a dome of silence. It fits snugly around the hood fastener, while the vacuum cup base fits snugly against the side of the hood, quickly and permanently eliminating hood rattles.

A lot of Noise about Silence

Dealers write us that it pays to shout about the merits of

Jorgensen HOOD SILENCERS

Of course it does — motorists appreciate a good turn, and in turn they tell others. We have yet to receive our first complaint.

Make a noise in your cash register by creating silence in your customer's auto hood. We have a very attractive proposition we would like to send you — may we?

Jorgensen Hood Silencer Co.
Hampton Road, Erie, Pa.



For every automotive need

Repairmen from near and far have found it worth while to order their gears from us because they are always able to get what they want when they want it. We furnish promptly transmission, differential or silent-timing gears. The quality of Ganschow Gears is almost proverbial.

Feel free to consult our engineering department.

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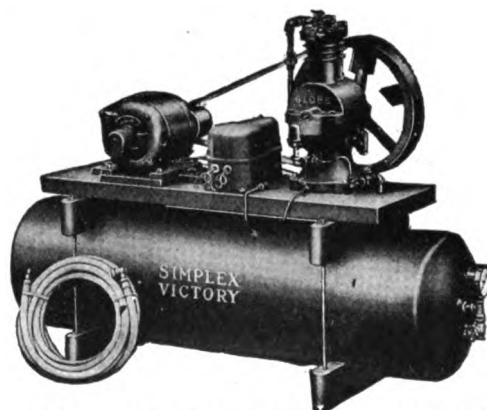


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Another good customer lost because the old compressor has fallen down on the job just when he wanted his tires filled.

WELL, YOU DON'T HAVE TO LET HIM GO.

Hold your old customers and make new ones with a dependable air supply—



GLOBE SIMPLEX TWO-STAGE COMPRESSOR

Guaranteed to Pump more air for the amount of current consumed than any other type of compressor on the market. High in efficiency—Low in operating cost—Simple in construction—Reasonable in price and on the job all the time.

DON'T WAIT. BUY NOW AND LET THE SIMPLEX END YOUR AIR TROUBLES.

GLOBE MANUFACTURING CO.
Battle Creek, Mich.

A New and Valuable Book on Automobile Radiator Repairing.

The repairman who wishes to keep his shop supplied with work for the winter months will not overlook the possibilities in the handling of radiator repairs.

Few towns are so small or so lacking in facilities that the repairing, rebuilding and recoring of radiators is not a practical possibility.

An exceedingly helpful book for those who contemplate the handling of this type of repairwork is to be had in the manual of instructions on automobile radiator repairing which is published by the F. L. Curfman Mfg. Co., Maryville, Mo.

The text matter is presented in the form of a practical talk on radiator construction and, by proven methods on typical jobs, the beginner is given a real working basis. The experienced man may also receive valuable bits of information.

The construction of nearly every radiator met with on popular cars is described in detail.

It is not the purpose of the authors, F. L. Curfman and T. H. Leet, to make any attempt to give all methods, but only some of the valuable ones. Among these is given the process of repairing frost-broken tubular radiators by pouring molten solder through the core.

The following chapter headings are indicative of the large amount of constructively helpful information presented in this manual: Material used in radiator construction; radiator construction; leaks in radiators; cleaning radiators; tinning; testing; the soldering iron; the torch; rebuilding and recoring; pouring; advertising, and suggestions to the repairman.

The book is completely illustrated and is one which is certain to be a valuable reference in any shop. It is offered at an attractive price.

Write the F. L. Curfman Mfg. Co., Maryville, Mo., about your copy now.

Many New Features Included in Williams Cylinder Grinder.

One of the most interesting of the new additions to shop equipment is found in the Williams cylinder grinder, which is now being marketed by the Hy-Way Service Co., 225 S. St. Joseph St., South Bend, Ind.

The Williams cylinder grinder does its work vertically and contains many new features. It is so simple in design that anyone can be taught its operation in a short time.

A notable feature is its unit construction—requiring no line shafting, countershaft, pulleys, or motor installation, all of these having been discarded in this new design.

The head is a unit casting with double motor drive, transmission, automatic reversing mechanism, feed and speed changes and grinding arbor. This unit casting contains all working parts, keeping them at all times

in alignment, and liberally and thoroughly lubricated by oil bath, oil vapor and oilers.

This unit head and power plant travels up and down a heavy double column, on ways of liberal dimensions and counterbalanced by weights in each column, at the will of the operator.

The grinding arbor is mounted vertically on the forward end of the transmission box, rotating in very large bearings and driven by bevel gears. It rotates at a constant speed of from 5,000 to 7,000 r.p.m., and is carried on double-row, annular ball bearings, which carry the weight of this shaft and take care of the thrust load.

Bronze is used for the center bearings, while the lower bearings at the grinding wheel are made from high-speed bronze, and are adjustable to take up all wear.

A dialing mechanism for adjusting eccentrics is provided that is very simple and easy to read and allows the operator to know at all times the size he is grinding.

The column is of twin design, cast together at the top and bottom, of liberal dimensions, thus making a stiff and rigid casting. The ways that the head travels on are cast integral, machined accurately and hand scraped to a perfect fit.

A base of heavy construction supports the twin column and forward part, which is machined and "T" slotted, and carries the universal table.

Quick setup of work is had through the universal table, which is readily cranked in and out and crossways for centering the work.

A floor space of 37 ins. by 42 ins. and the connection of power wires are all that are required for the installation of a Williams cylinder grinder.

Further details can be had upon request addressed to the Hy-Way Service Co., 225 S. St. Joseph St., South Bend, Ind.

Book Review.

DYKE'S AUTOMOBILE & GASOLINE ENGINE ENCYCLOPEDIA, by A. L. Dyke. Published by The Goodheart-Wilcox Co., Inc., 2009 S. Michigan Ave., Chicago. 1,238 pages, 4,143 illustrations, 6½ ins. by 9½ ins.; price, cloth bound, \$6, flexible American Morocco, \$7.50. Thirteenth edition.

Dyke's Automobile Encyclopedia has become so well known throughout the automobile industry and its value as a reference book is so generally recognized that it would seem hardly necessary to present a detailed description of the new edition here. And yet, when you pick up a copy of this new edition, you are at once impressed with its marvelous completeness, and with the fact that it really is, in every sense of the word, a new book.

The text has been entirely rewritten and the number of illustrations increased by several hundred. We understand that the author has spent his entire time during the past two years in rewriting the book from cover to cover. It would seem that, in this new edition, nothing has been left unsaid.

The entire field of the automobile is completely covered, and it is a work that will greatly add to the already enviable reputation which the earlier editions have attained.

The new edition presents the elementary principles of electricity and magnetism, in order that the reader may be thoroughly informed before he passes to ignition and the other electrical subjects. Starting motors and generators are discussed and explained in a non-technical manner, assisted by hundreds of illustrations, in a masterly way that makes this somewhat intricate subject thoroughly understood.

That portion of the book which is devoted to electrical tests begins with an explanation: "Dividing Electric Systems into Parts, and Troubles that Could Occur in Each Part." Then follows a discussion of testing methods and devices, including meters, millivolt readings (simplified), armature and field tests with meters, test points, growlers, etc.

Moreover, a complete diagnosis is given of all possible electrical troubles; and the reader is instructed how to test on the car and on the bench, and how to rig up home-made testing devices. To this end, modern testing devices are illustrated and used as examples.

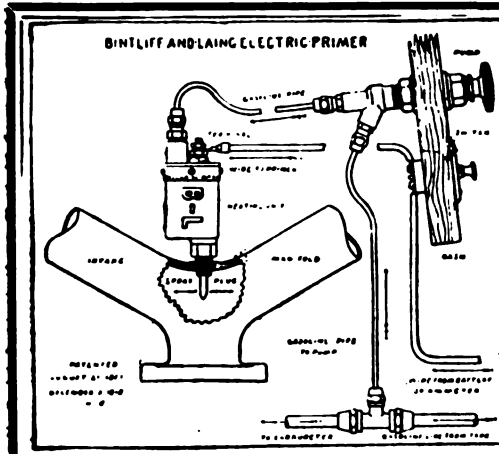
This section, apparently interesting to the repairman only, is so simplified that the car owner will have no difficulty in diagnosing his own electrical troubles.

The internal action of the storage battery, with chemical terms simplified, is another outstanding feature of this edition. Instructions for the repair of the storage battery include high-rate discharge, cadmium and other tests, all simplified to the level of every-day practice. To the average man, the internal action of the storage battery is a closed book. This section makes the subject clear to even the casual reader.

The important subject of repairs covers every part of the car: engine, clutch, transmissions, universal joints, rear axle parts, electrical parts, etc.; how to repair radiators, tops, tires, oxy-acetylene welding, burning out carbon, adjusting and fitting bearings, enlarging cylinders, fitting pistons, rings, differential gears, etc.

A complete instruction section is devoted to "How to Separate the Wiring Diagrams into Eight Circuits, and How to Trace Each." This is something new, and should prove a wonderful help to all classes of automobile men. The book shows 159 wiring diagrams, most of them with arrow points facilitating the tracing of the circuits.

The new book offers a notable improvement over earlier editions in that the old method of using "chart" pages, with several illustrations on a page, and of referring back to them from different sections of the book, is now entirely done away with. Instead, each illustration appears with its appropriate subject. The clear understanding of any discussion is thus greatly facilitated.



"B & L" HOT GAS PETROLIZER

Electrically Heated

Will convert the incoming gasoline from liquid to a hot vapor which will start your car in the coldest weather. Can be applied on any make of automobile.

Price \$12.00, with complete fittings

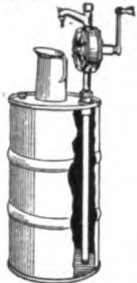
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Pump direct from the Shipping barrel.



Attached to barrel in less than five minutes.

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CAPACITY FROM ONE PINT TO TEN GALLONS PER MINUTE

A PUMP that meets the wants of the GARAGEMAN and SERVICE STATION and sells to the trade using GASOLINE, KEROSENE, Light or Heavy OILS. Serves small quantities, Has VOLUME to transfer a barrel of fluid in ten minutes. Barrel is LEAK PROOF when pump is attached. Can be placed at the curb where exposed to the weather. FARMERS can pump their GASOLINE direct from the shipping barrel to the tanks of their machines, saving TIME, WASTE, LABOR and cost of STORAGE TANKS. Pumps either to or from the barrel or tank. Write Today for Dealers' Discount, No limit to prospects. Pumps sold on trial.

Contains no Leather or

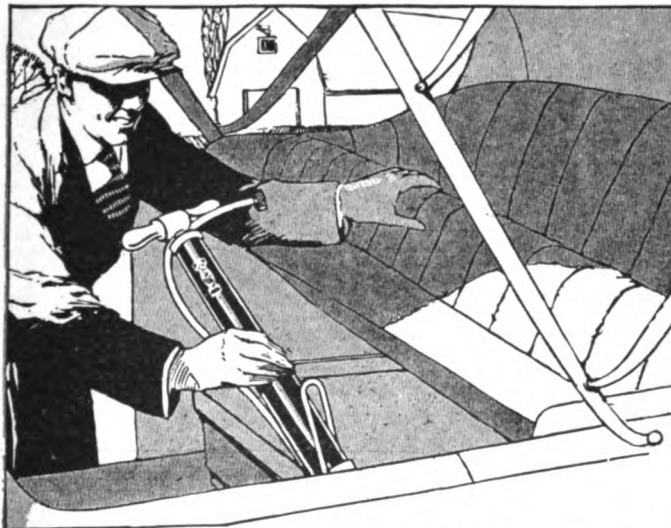


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MECHANICAL DEVICES CO., Mfrs.

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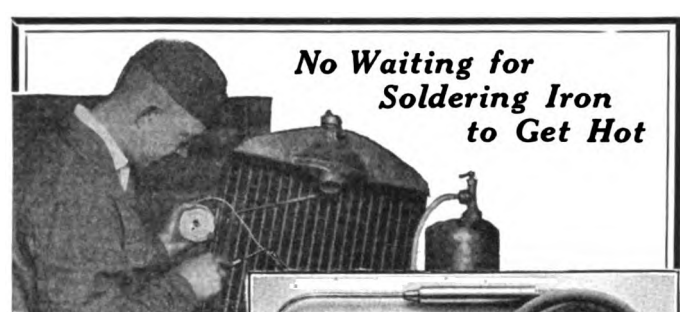


Three Million Owners

Chance did not cause three million folks to buy Rose Tire Pumps. They bought because they knew and their dealers knew the Rose would **deliver the goods**. The Rose leads all others in sales because it is a better pump at a moderate price. Ask 'em to buy. Tell 'em about the valve and 5-year guarantee.

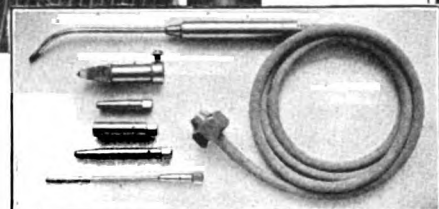
FRANK ROSE MFG. CO., HASTINGS, NEBR.

ROSE TIRE PUMP



No Waiting for
Soldering Iron
to Get Hot

Instant Heat
for Soldering,
Radiator
Repairing,
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TORIT TORCH OUTFIT No. 13

Whether the job is lead burning, battery sealing, fender straightening, radiator soldering or loosening a rusty or corroded nut, the Torit No. 13 Torch is always ready at a second's notice to serve you, and the price is wonderfully low. It is handy for soldering tinware, babbiting, joining light tubing, aluminum soldering, soldering electrical connections, etc.

USES ACETYLENE ONLY

A splendid use for discarded auto acetylene tanks. Many owners make the Torit No. 13 pay for itself in a single day. Torch with 4 different tips, soldering copper, 5 ft. tubing and connection for auto acetylene tank.

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ORDER TODAY FROM YOUR JOBBER, OR

ST. PAUL WELDING & MFG. CO.
165 W. Third Street U. S. A. St. Paul, Minn.

The index is one of the great features of this work. It contains more than 14,000 captions, classified into three great divisions of major subjects, minor subjects and miscellaneous subjects. Complete as it is, the voluminous cross-references embodied in it serve as guide posts to the reader that point him instantly to every reference on any given subject.

To the car owner who finds himself in difficulty, to the repairman who needs instant information, to the student seeking comprehensive knowledge, the value which this adds to the effectiveness of the book will be obvious.

A dictionary of motoring terms is also included.

The repairman will find technical subjects so simplified that he will have no difficulty in understanding and mastering the most intricate details. The car owner will find that this book will enable him to quickly diagnose his own troubles. The student who uses Dyke's Automobile Encyclopedia is led from the elementary principles to their active application. The progress from subject to subject is natural and orderly, making it easy for anyone who wishes to learn the theory and practice connected with the automobile.

Because of the great number of subjects covered, it is not possible to name all of them. However, the following titles of the 13 principal sections give an outline of the ground covered by this immensely valuable volume:

Assembly of the Automobile; The Automobile Electric Systems; The Storage Battery; Wiring Diagrams; Ignition and Carburetion; Tires; Garage and Shop Equipment; Repairing and Overhauling Engine and Car; Oxyacetylene Welding; Commercial Cars; Tractors: Ford Car, Tractor, etc.; Data, Specifications, Horsepower, and Useful Information. Each subject is covered in the greatest possible detail.

It is difficult to express adequately the vast fund of practical, helpful and complete information on every phase of automotive repairwork and automobile operation, and the care that has been brought together in this one comprehensive volume—and that

in a clear, systematic and logical arrangement that makes it an ideal reference book.

10,000 Miles of Highway Added to Federal-Aid System.

Ten thousand miles of completed federal-aid highways were added to the mileage of the nation's good roads during the last fiscal year, according to a compilation by the Bureau of Public Roads, U. S. Department of Agriculture. The bureau administers the federal-aid program and its summary of results was placed before the annual conference of the Highway Education Board held in Washington late last month.

The bureau finds that the present calendar year has broken all records for road construction. Based on all available data, which are not complete, however, the bureau estimates the total sum to be spent in the United States this year on highway construction at \$742,000,000. The figures include federal-aid roads and projects built in addition by the states and smaller municipal units without the aid of federal funds.

At the beginning of the last fiscal year, according to the bureau's figures, the total mileage of completed federal-aid highways was 7,500. There were under construction at that time an additional 18,000 miles in various stages of completion.

The close of the fiscal year finds the total completed mileage of federal-aid roads more than doubled, reaching a total of 17,700 miles. Federal-aid highways under construction at the end of the fiscal year totaled 14,500 miles which, in the aggregate, were estimated by the bureau to average 56 per cent of completion.

Total mileage of

federal-aid highways completed during the past year was highest in Texas with 933 miles.

Five states—Arkansas, Georgia, Iowa, Minnesota and North Carolina—each reported more than 500 miles of federal-aid highway completed within the year, while there were two states—Montana and Wisconsin—that had completed more than 400 miles each.

More than 30 miles of bridges have been built on federal-aid highway projects since 1916. One of the longest of these—the bridge from Mandan to Bismarck, N. D.—is more than 3½ miles in length and cost \$1,428,000, of which the federal government contributed 50 per cent of the total cost of construction.

Resolutions approved by the Conference stress the need for training in schools and colleges which will make for better regulation and segregation of highway traffic and more safety for life and limb. A study of the sociological aspects of highway transportation in the interest of the farm population also was presented in resolutions and given approval by the Highway Education Board during this meeting.

Service

"I had six honest serving men;
(They taught me all I knew);
Their names are **WHAT** and **WHY** and **WHEN**,
and **HOW** and **WHERE** and **WHO**."
(Kipling)

WHAT was the Declaration of London?
WHY does the date for Easter vary?
WHEN was the great pyramid of Cheops built?
HOW can you distinguish a malarial mosquito?
WHERE is Canberra? Zeebrugge?
WHO was the Millboy of the Slashes?

Are these "six men" serving you too? Give them an opportunity by placing

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in your home, office, school, club, shop, library. This "Supreme Authority" in all knowledge offers service, immediate, constant, lasting, trustworthy. Answers all kinds of questions. A century of developing, enlarging, and perfecting under exacting care and highest scholarship insures accuracy, completeness, compactness, authority.

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Write for a sample page of the *New Words*, specimen of Regular and India Papers, also booklet "You are the jury," prices, etc. To those naming this magazine we will send free a set of Pocket Maps.

G. & C. MERRIAM COMPANY, Springfield, Mass., U.S.A. Established 1831

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Efficiency, Simplicity and Durability, this in a nutshell explains the Ewald.

It makes driving Safer and Easier. Every Ford Owner needs and wants an Ewald.

The Ewald is unaffected by road jolts and jars.

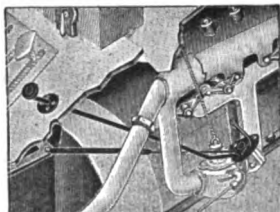
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"Customers like them—they're so convenient—no stopping to make change. They like the discount made for cash, too.

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Samples will interest you.

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Cars start hard in cold weather because they are cold. Therefore the heat principal is correct.

POMEROY PATENTED ELECTRIC GASAFIER

\$5 COMPLETE FOR ALL CARS

has proved for four years in United States and Canada that it starts cars as easily in winter as in summer. It will outlast any car. A trial carton will convince you, Mr. Dealer.

Our References: Any Rochester, New York jobber.

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*Have them
Rebabbitted*

Bearings of S. A. E. specification babbitt, poured in rod, broached to crankshaft size. New bolts and nuts, laminated shims and new bronze bushings put in many of the popular car rods. Bronze back bearings rebabbitted and machined to standard size or special sizes for reground crankshafts. One-day service.

CONNECTING ROD AND CRANKSHAFT BEARINGS

Send parts to nearest factory for prompt service:

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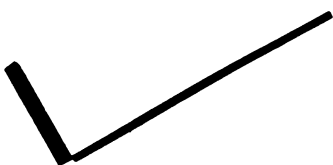
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ALL-STATES REBABBITTING SERVICE

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WATKINS MFG. COMPANY

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Check It. It's Important!



Among the things you need for the shop—don't fail to check the Buffum Buick Valve Remover. It makes valve cleaning easy—removes danger of broken valves and washers which often attend the use of the crowbar when removing valves. Your customers will find the Buffum Buick Valve Remover handy, too, to carry with them in their tool boxes. Tell them about the Buffum. It retails for \$2.00.

Get all the particulars now. Write.

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POSITIVE ALWAYS; IF IT IS A MATTER OF RESULTS! FRANKLY, IS YOUR SERVICE DEPARTMENT OPERATING ON THIS BASIS? IF NOT, BETTER GET IN TOUCH WITH US AT ONCE, AS WE ARE IN A POSITION TO ASSIST YOU.

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MOST PERFECTED PISTON RINGS



Stop oil pumping with two rings per piston. Even wall pressure every thirty degrees. No springs, pins, drilling of pistons or motor changes to make.

No carboning or sticking in the grooves. Sold with a money-back guarantee.

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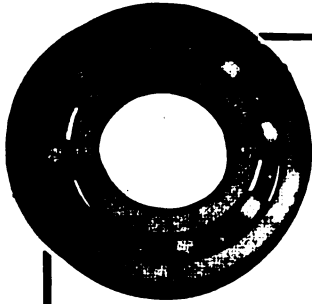
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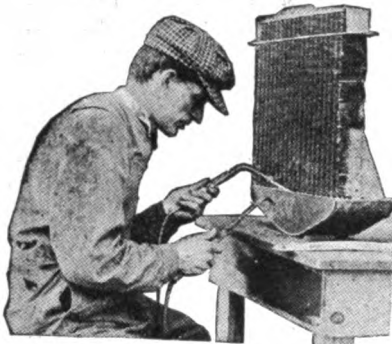
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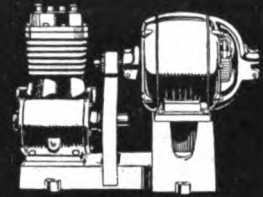
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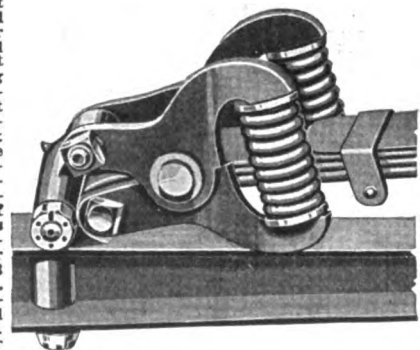
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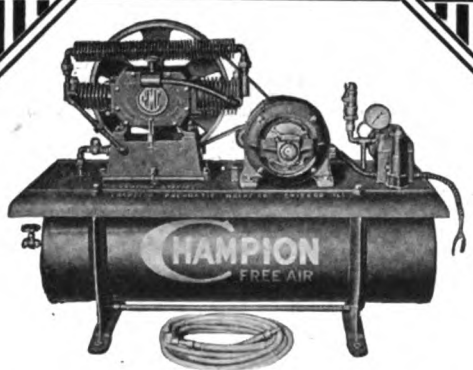
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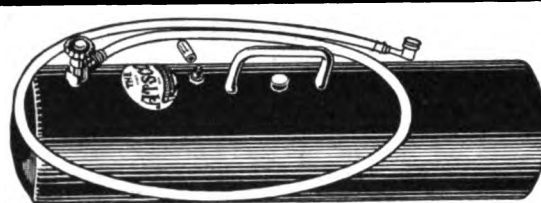


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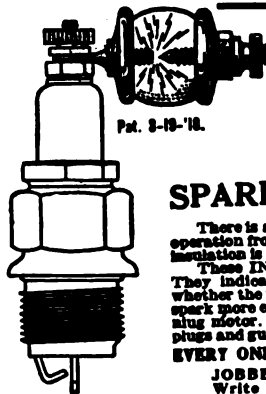
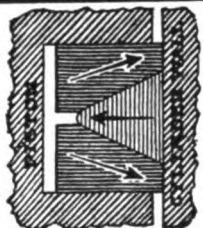
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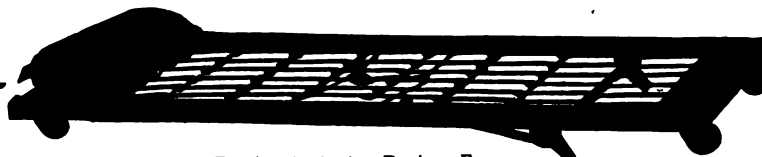
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 Curtis Pneumatic Machinery Co., 1515 Kienlen Ave., St. Louis, Mo.
- TRUSSES (FOR GARAGES)**
 Leo McDaniel Contracting and Engineering Co., Cairo, Ill.
- TUBES**
 Broadway Tire Jobbers, 250 W. 54th St., New York City.
- VALVE CUTTERS AND REFACERS**
 M. B. Skinner Co., 552-562 Washington Blvd., Chicago.
- VALVE CAPS AND VALVE INSIDES**
 A. Schrader's Son, Inc., Brooklyn, N. Y.
- VALVE REPAIR TOOL**
 A. Schrader's Son, Inc., Brooklyn, N. Y.
- VALVES**
 Remort Mfg. Co., Oakfield, Wis.
- VALVE GRINDERS**
 Albertson & Co., Sioux City, Iowa.
 Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.
- VALVE GRINDING COMPOUNDS**
 Abrasive Sales Corp., 17 E. 49th St., New York City.
- VALVE REFINING TOOLS**
 Universal Equipment & Supply Co., 107 N. Franklin St., Syracuse, N. Y.
- VALVE REMOVERS**
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- VISORS, ALUMINUM**
 International Stg. Co., 400 S. Leavitt St., Chicago, Ill.
- VOLTMETERS (POCKET and DASH)**
 Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, O.
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 Saint Louis Machine Tool Co., St. Louis, Mo.
- WELDING EQUIPMENT**
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 F. A. Albertson & Co., 306 9th St., Milwaukee, Wis.
- Muller Flexible Shaft Mfg. Co., St. Paul, Minn.**
 St. Paul Welding & Mfg. Co., 165 W. 3rd St., St. Paul, Minn.
- WORK BENCHES (Portable)**
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ASK YOUR JOBBER TO DEMONSTRATE THE

CADY PISTON RING COMPRESSOR

IF HE CAN'T, WRITE US

WAGLEW MANUFACTURING COMPANY

SYRACUSE, N. Y.

INSTANSEAT seat instantly PISTON RINGS

Dealers say—"It pays to handle INSTANSEAT rings because:

Customers desire *quick results*—Preventing passage of excess oil
guarantees *against come-back jobs*—Individual virgin grey iron castings
insure *good results after long usage*—

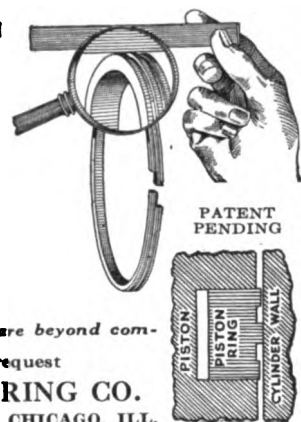
and because

Quality, prices, and discounts are beyond comparison.

Sample ring mailed on request

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JAFFE the NATIONALLY ADVERTISED QUALITY RADIATOR for FORDS



Our \$100.00 reward guarantee against freezing damage, together with our nation-wide reputation for quality and up-to-the-minute service mean easy sales for you. Our large dealer's profit per sale means larger returns to you.

Write us. We have something to tell you that means more money to you.

JAFFE RADIATOR COMPANY

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MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

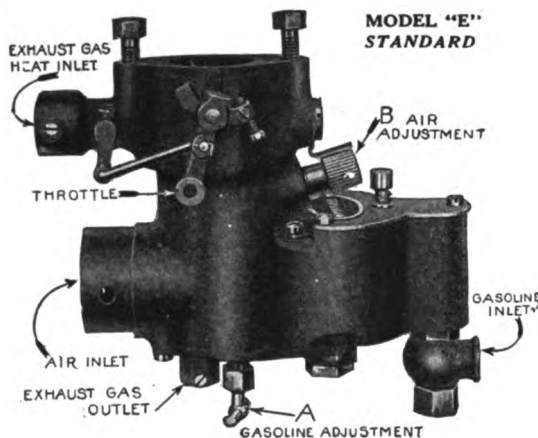
ECONOMICAL—

SIMPLE—

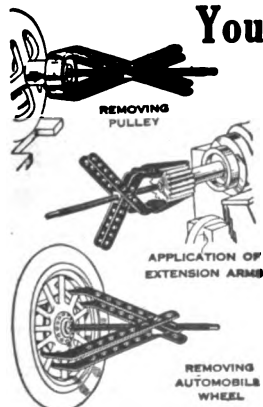
Write for our new Catalogue

MARVEL CARBURETER CO.

FLINT, MICHIGAN, U. S. A.



You Need One or Both These Gear and Wheel Pullers



The "LITTLE GIANT"

pulls any gear, wheel or pulley—anywhere—in a jiffy. Built on the only correct principle—produces maximum efficiency with minimum effort. Can't twist off or let go. Made of best grade drop forge steel. Adjustable up to 13" diameter. Price complete with extension arms \$12. Satisfaction guaranteed or money refunded. Order one today or write for data.

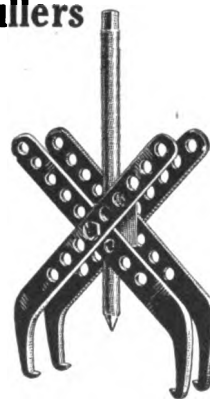
"THE HARDER THE PULL—THE TIGHTER THE GRIP"

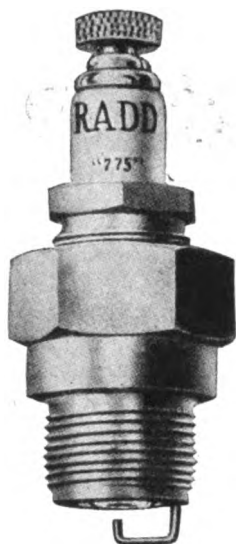
Write for dealers' discounts and literature

Premier Electric Co., 3802 Ravenswood Ave., Chicago

"BIG BUSTER"

This heavy duty puller is designed to cover a range of work upward from where the "LITTLE GIANT" and other tools leave off. Weighs 100 lbs.—open adjustment 40". Pulls heavy motor truck and car wheels, ship and aeroplane propellers, heavy fly and gear wheels, transmissions, etc., easily. Can't slip off work—no arm locks required. Price complete with wrench and handle, \$50. Where you have a job no other puller will touch you need a "Big Buster."





There are spark-plugs — and spark-plugs, but the Radd — it's "different."

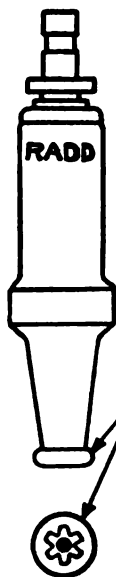
Dealers are finding that the Radd is the sparkplug that customers ask for—that customers insist upon—that customers buy. And these dealers know that their customers keenly appreciate the disappearance of oil troubles — and misfiring — the smooth starting, smoother running of the motor—and the

saving in gasoline—which the use of the Radd sparkplug makes possible.

Just a word about the construction of this wonder sparkplug. It has an auxiliary electrode or cap (an exclusive feature) generating a small spark in advance, thereby greatly aiding the discharge of the main gap by freeing the electrous to carry the current. The result—a larger, hotter spark.

Here is a coupon for your convenience. Fill it in immediately. Offer your customers the advantages to be gained through the use of Radd plugs—and last, but not least, add a line that will bring you the accumulation of fall profits that you want!

**LEICH ELECTRIC
COMPANY**
GENOA ILL.



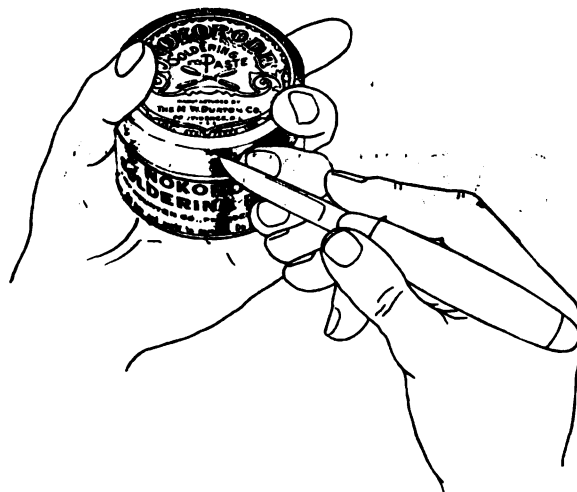
RADD
The
**SPARK
PLUG**
with the
CAP

Leich Electric Co.,
Genoa, Ill.

Kindly send a set of plugs for car
on trial. Also prices to dealers.

Name

Address



DATE THE CAN!

It's Easy To Prove Its Long Life.

Of course the main reasons why millions swear by NOKORODE SOLDERING PASTE are:—its non-corrosive qualities, the way it flows under the seam, and the safety that it gives from burns and fumes. But its economy is important, too. You can prove how long it lasts: Buy a can, and scratch the date on the cover. Use the Paste until it is all gone. Note the date when it is all used up. Here is what you will find:

1. NOKORODE is the long life Paste. You will get from it an almost unbelievable number of soldered joints.
2. NOKORODE makes the long life job. It doesn't corrode or rust.
3. NOKORODE gives you long life comfort. You are not subjected to burns and disagreeable fumes.

**Learn more about the long life
soldering paste by sending for a free
sample.**

The M. W. Dunton Co.
Providence, R. I. U. S. A.

Ford Cars are Not Made to Chatter

WHEN they do they are not properly lubricated. There is no chatter to a Ford when En-ar-co (Light) Motor Oil is used and kept at the correct level; the crank case drained, flushed and refilled with fresh, clean En-ar-co Oil every 500 miles.

En-ar-co
SCIENTIFIC REFINING
MOTOR OIL

THE OIL OF A MILLION TESTS

In making En-ar-co Oils we average over a million tests a year. It is only by this multiplying of tests that perfect products can be made. This thoroughness in our Scientific Refining processes is the protection offered to users of our products.

Why En-ar-co Motor Oil is Better

All refiners make lubricants just as all cooks make biscuits, yet there is as much difference in oils as there is between the delicious light, flaky biscuits mother makes and the heavy, soggy apologies for biscuits some restaurants serve. In each case the raw materials are practically the same, but the "making" is different.

To protect and safeguard your motor, use En-ar-co Motor Oil in your auto, truck or tractor. It contains no sediment-forming impurities. It is always uniform in excellence.



Dealers Write us for particulars regarding En-ar-co Boy and Slate Sign and our unique sales plan on En-ar-co Motor Oil.

THE NATIONAL REFINING CO.

705-B National Bldg.

Cleveland, O.

Scientific Refining—In Business 40 Years

Producers of Crude Oil, Refiners and Marketers — Four Modern Refineries—Complete Distributing Branches in 96 Cities



You know Spee-Dee — that handy hand cleanser. It now comes in a convenient collapsible container. Fine to tuck in the side pocket of the car for no-water washups. Tubes are packed in nifty display cases.

Sell a tube of Spee-Dee and you'll sell a 27-oz. can for the garage and 25-lb. pail for the home. Cases of 3 doz. tubes—\$3.60. Retail \$5.40. 50% profit. And a greater profit for you in our introductory offer.

Quick—Dealers—Our Special Introductory Offer

STATES CHEMICAL CO.

680 West Austin Ave.

Chicago, Ill.



Handy Size Tube

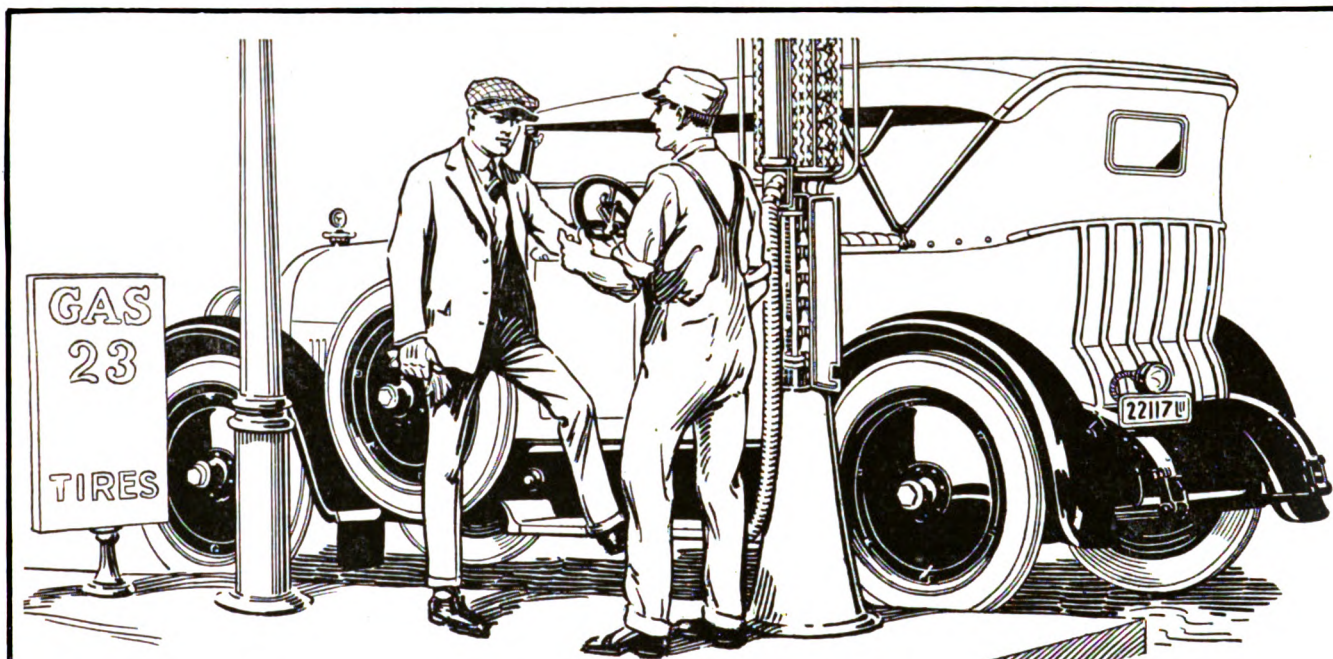
15¢

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

DECEMBER, 1922

Vol. 13—No. 12.
10 Cents the Copy.
\$1.00 Per Year.



“Got Plenty of Patches for Your 5-Minute Vulcanizer?”

It's an easy question to ask while you are selling gas or changing a tire or loaning a pair of pliers. It's the easiest way to “ask 'em to buy.” If the driver has a **Shaler 5-Minute Vulcanizer** he is likely to be almost out of patches to use with it and he will welcome the suggestion. If he is one of the few who doesn't have a vulcanizer, he'll say so and give you the easiest kind of an opportunity to make a sale.

**Remember how pleased you were
with your first SHALER Vulcanized Repair?**

Without doubt this is one of the most popular accessories on the market today. Of course **you** know that anyone can use it to make permanent tube repairs on the road in five minutes. You know how pleased you were the first time you used one and saw it **vulcanize** as quickly as you could stick on a temporary patch. Pass your experience along to your customers, especially the tourists, and cash in on the sales of patches that always follow the sales of vulcanizers.

Window Display Material—FREE on Request

We will supply dealers with attractive window display cutouts and posters, attractive counter display cutouts and circulars FREE on request.

C. A. SHALER COMPANY, 361 Fourth Street, WAUPUN, WISCONSIN



A Perfect Piston Ring—

Must Have *All* the Following Features:

- 1 Material and Workmanship**
Soft, uniform, close-grained gray iron, machined to proper dimensions.
- 2 Uniform Wall Pressure**
Properly graduated hammer blows on entire inner circumference, providing a uniformity of wall pressure. A vital characteristic in a piston ring to make it hug the cylinder wall throughout its circumference.
- 3 Permanent Tension**
Tensions that are *hammered* in physically with electric hammers, and which will be unaffected by motor temperatures.
- 4 Last but not least
OIL CONTROL**
A ring which prevents the oil not only from passing the ring face, but around the ring as well.

A trial will prove that ALL these features are to be found in the

COMPLETE STOCKS

n all sizes and oversizes are carried by these distributors.

They will give you immediate service and their ring experts are at your disposal.

| | |
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| ALABAMA Birmingham—Fulenwider Auto Supply Co., 213 E. 21st St. | MASSACHUSETTS Boston—Replacement Parts Company, 801 Beacon St. |
| ARKANSAS Little Rock—J. B. Cook Auto Machine Co., 620 W. 7th St. | MINNESOTA Minneapolis—Marshall Racine Rubber Co., 1316 Harmon Place. |
| CALIFORNIA Fresno—Garvey Foote Co., Inc., 1423 Broadway. Los Angeles—Osler Racine Rubber Co., 312 W. Pico St. Sacramento—Garvey Foote Co., Inc., 1014 12th St. San Francisco—Garvey Foote Co., Inc., 382 Golden Gate Ave. | MISSOURI Kansas City—Motor Rim & Wheel Mfrs. Co., 2110 Grand Ave. St. Louis—Motor Rim & Wheel Mfrs. Co., 3337 Lindell Blvd. |
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RICHMOND

Electrically Hammered

PISTON RINGS

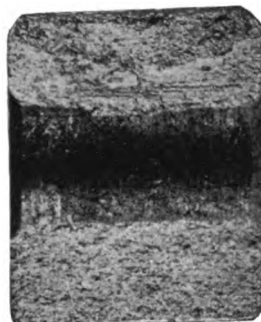
RICHMOND, INDIANA

Why Red Star Timer Stands Up

Unretouched photograph of
Red Star 100 point Carbon
Tool Steel Roller, broken
in half.



Unretouched photograph of
Ordinary Steel Timer Roller,
broken in half.



\$2.00

complete



NOTE the closer grain of the steel in Red Star roller. Compare it with the ordinary roller. The Red Star is made of 100-point carbon tool steel. Ordinary timer rollers are common steel, surface hardened.

Surface hardening, at best, lacks uniformity. It depends on getting carbon into the surface pores of the steel—and common steel varies. Being irregularly hard, it wears unevenly, develops high spots or bumps. The hardened surface wears off in spots, leaving an extremely irregular surface.

The Red Star roller is uniform throughout, in carbon content and in hardness. The steel is made with the carbon in it. The Red Star roller is tempered just as a tool is tempered. It is accurately ground and polished to a mirror finish. It gives uniform wear, a smooth, uniform surface free from bumps or irregularities, until it is completely worn out. The Red Star 100-point carbon Steel roller is just one feature that

makes Red Star the finest timer for Fords. A Ford timer roller does a tremendous amount of work. Its speed averages 1000 to 2000 revolutions per minute under pressure and it closes and breaks the electrical circuit four times for each complete revolution of the rotor assembly. It is clear that the roller is the most important part of a timer. If it is to do its work properly and last, it must be made of the very best material and workmanship.

**AUTO COMPONENTS, Inc., Division of
ADVANCE AUTOMOBILE ACCESSORIES CORP.**
Dept. 1350, 1721 Prairie Avenue, Chicago

Install on Red Star Timers. Look for the Red Star. Dealers can get Red Star instantly from any wholesale house in the country. Our new 1923 catalog will be sent free to any established dealer who writes us on his letterhead.

ADVANCE

Equipment

-The Quality Line

Other Quality Articles Made by Advance



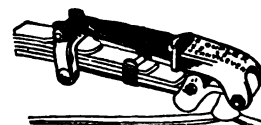
Advance Feltbak—the new brake lining for Fords—lubricates itself and softens the brake action.



White Stripe—highest grade plain Brake Lining for Fords.



Duplex Shock Absorbers eliminate bounce, sideways, vibration—through the "Duplex" action.



White Stripe Fan Belt outwears six of ordinary kind. For all cars.

Advance Asbestos Brake Lining for larger cars—made from genuine asbestos.





Thirty-Seven BRANCHES

In thirty-seven cities throughout the country you will find Ahlberg Factory Branches, each carrying a complete line of Ahlberg Ground and new ball and roller bearings for the convenience of the trade.

Each branch is under the supervision of a trained bearing specialist, whose services are at your command.

Call our nearest branch when you need bearings or bearing information.

**AHLBERG
BEARING
COMPANY**
321E.29th St. Chicago



DATE THE CAN!

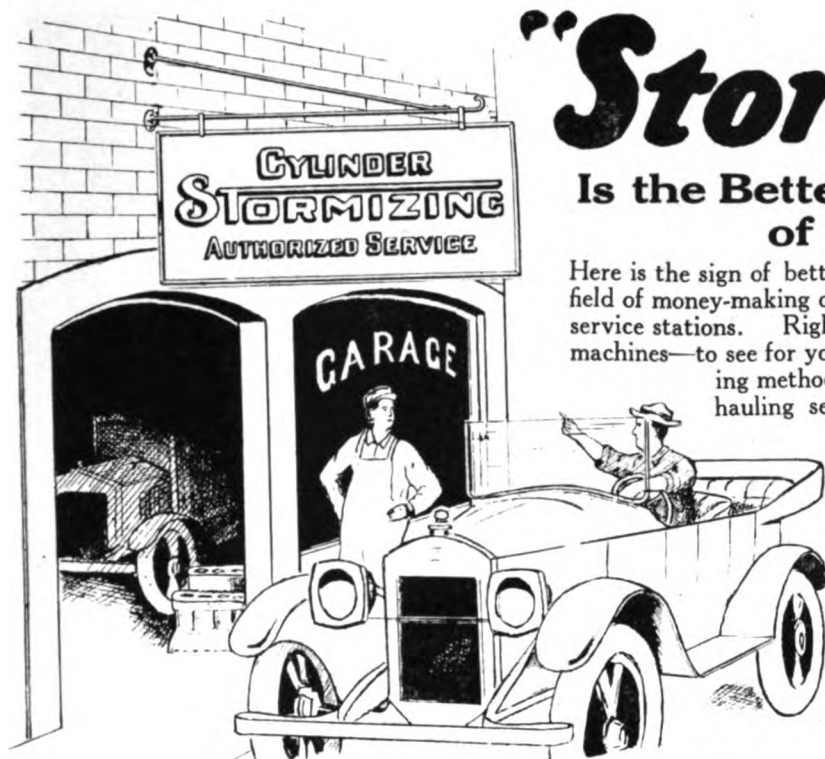
It's Easy To Prove Its Long Life.

Of course the main reasons why millions swear by NOKORODE SOLDERING PASTE are:—its non-corrosive qualities, the way it flows under the seam, and the safety that it gives from burns and fumes. But its economy is important, too. You can prove how long it lasts: Buy a can, and scratch the date on the cover. Use the Paste until it is all gone. Note the date when it is all used up. Here is what you will find:

1. NOKORODE is the long life Paste. You will get from it an almost unbelievable number of soldered joints.
2. NOKORODE makes the long life job. It doesn't corrode or rust.
3. NOKORODE gives you long life comfort. You are not subjected to burns and disagreeable fumes.

Learn more about the long life soldering paste by sending for a free sample.

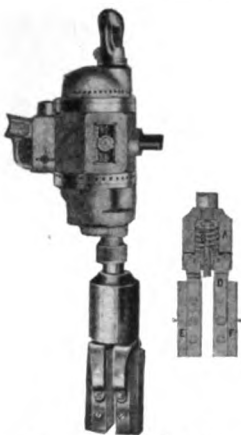
The M. W. Dunton Co.
Providence, R. I. U. S. A.



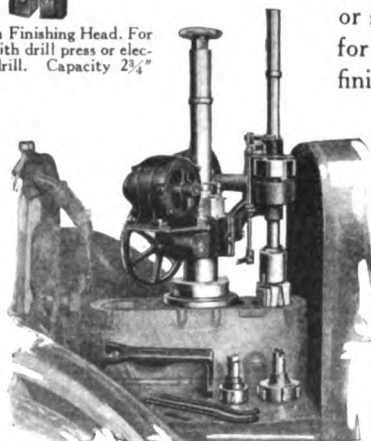
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Is the Better Method of Cylinder Refinishing

Here is the sign of better service—a sign that is opening up a new field of money-making opportunities to garage men, repairmen and service stations. Right now is the time to investigate Stormizing machines—to see for yourself just what is this new cylinder refinishing method. Don't wait until the great motor overhauling season is on you. Learn for yourself what Stormizing can mean to you in cold dollars before your competitor hangs up a Stormizing service sign on his door.



Storm Finishing Head. For use with drill press or electric drill. Capacity $2\frac{3}{4}$ " to 8".



Portable Stormizing machine, capacity $2\frac{3}{4}$ " to $4\frac{1}{2}$ ". For motor drive.

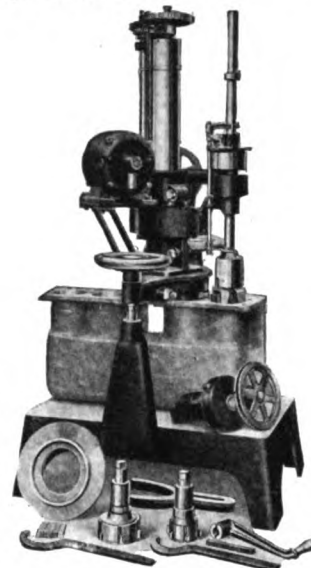
Why pass by the profits of cylinder work? Why not get all the profits from your motor repair jobs? By the Stormizing process the worn cylinder is first trued up by a cutting operation, then by a grinding or honing process given a "gun-barrel" finish. Stormizing machines are automatic and self-centering. Right in your own shop you can now produce with a patented Stormizing machine "cannon bore" trueness and "gun barrel" finish on any kind or size of cylinders. Stormizing equipment will efficiently remove as small or great an amount as is necessary. Particularly efficient for renewing cylinders where only slightly worn or for finishing after re boring or previous machining operations.

With each Stormizing machine we furnish an attractive sign for your building and supply of trade helps to aid you to bigger, better service and splendid profits. Write for details.

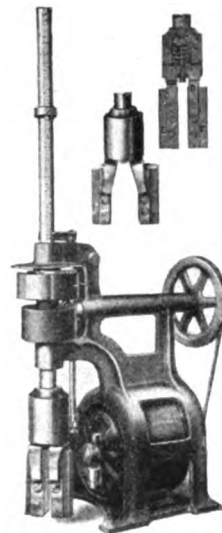
STORM MFG CO

406 6th Ave., South, Minneapolis, Minn.

Department E



Semi-portable type, capacity $2\frac{3}{4}$ " to 6", built for motor drive or drill press.



Automatic Finishing Machine with a capacity of $2\frac{3}{4}$ " to 8".

STORMIZING

"The Better Method of Cylinder Refinishing"

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

American Garage & Auto Dealer

A Business Paper Exclusively for the "Small Town" Automotive Trade

STANLEY R. EDWARDS, Editor

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116 South Michigan Avenue, CHICAGO

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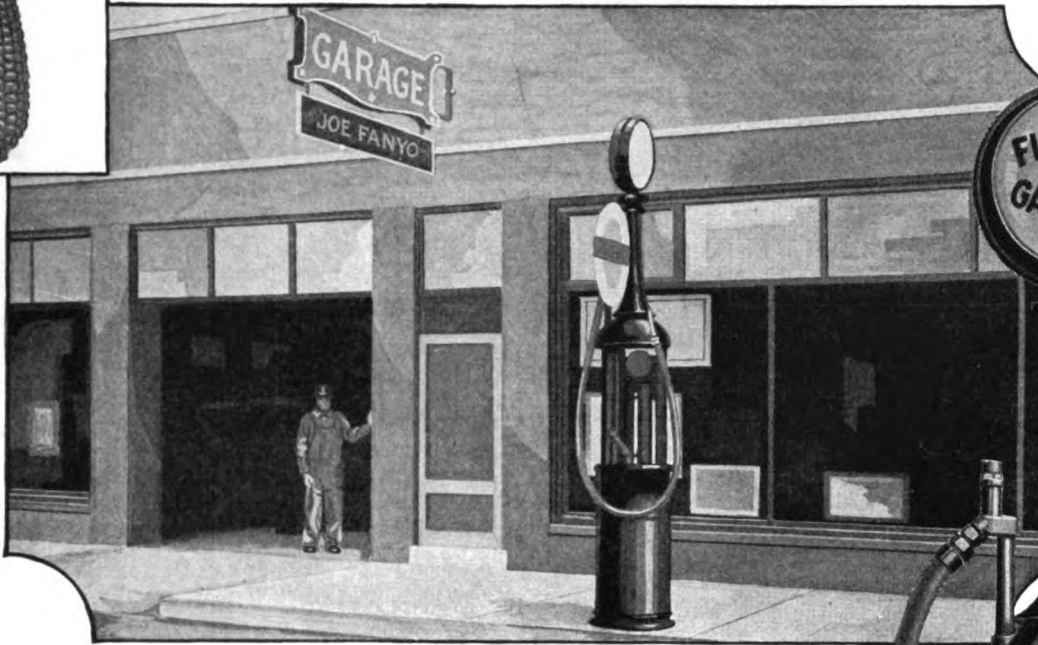
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The subscription price of AMERICAN GARAGE & AUTO DEALER is \$1 per year (U. S. and possessions); Canadian and Foreign, \$1.50 per year. Single copies, U. S. A., 10 cents.

Postoffice Entry—Entered as Second Class Matter March 1, 1916, at the Post Office at Chicago, Illinois, under the Act of March 1, 1879.



Sells gasoline "Accurately and Quickly"

"Yes, I have found this pump entirely satisfactory. It never gives any trouble—just goes right along selling gasoline accurately and quickly."

That is what Joe Fanyo says of the Wayne Honest Measure Gasoline Pump which stands on the curb in front of his sales room and service station on the Corn Belt Route at Watseka, Illinois.

"And it is a help to my regular business," Mr. Fanyo adds. "Tourists seem to prefer to stop at a garage. A pump invites them to do so, and thus gives us a chance to sell them gasoline and oil and perhaps to do some service work for them too. I would not be without it."

Mr. Fanyo's statement is only another added to the already long list of favorable opinions which garage owners on the highways of the nation hold regarding Wayne Honest Measure Pumps.

Because Wayne Honest Measure Pumps are consistently reliable in their performance, they are to be found everywhere, giving entire satisfaction to their owners and selling gasoline "accurately and quickly."

Bulletin 276-AGD describes the Wayne Standard Five-Gallon Pump. Won't you send for this bulletin? You'll find it interesting and profitable.

Wayne Tank & Pump Co., 774 Canal Street, Fort Wayne, Ind.

Canadian Tank & Pump Co., Ltd., Toronto, Ont., Canada.

Division Offices in: Atlanta, Boston, Chicago, Cleveland, Dallas, Detroit, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, San Francisco and Los Angeles.

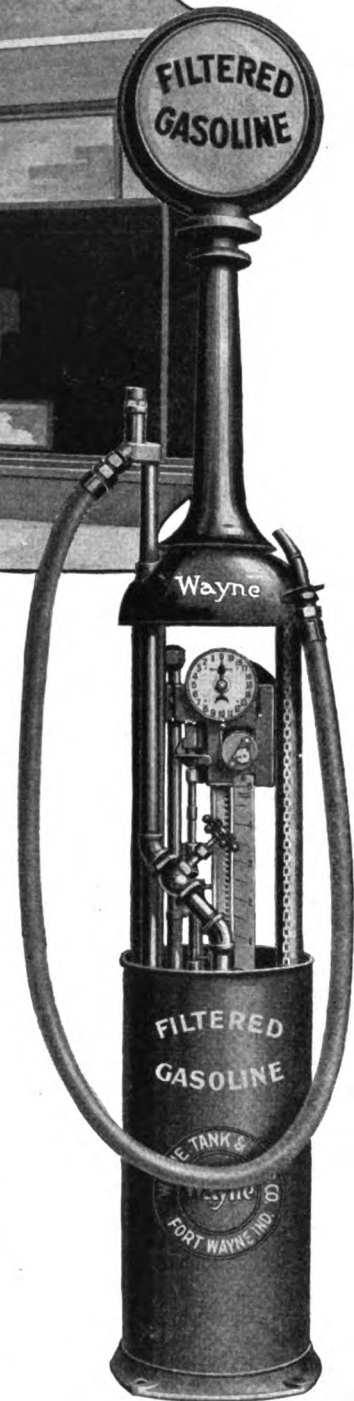
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An International Organization With Sales and Service Offices Everywhere

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TRADE MARK

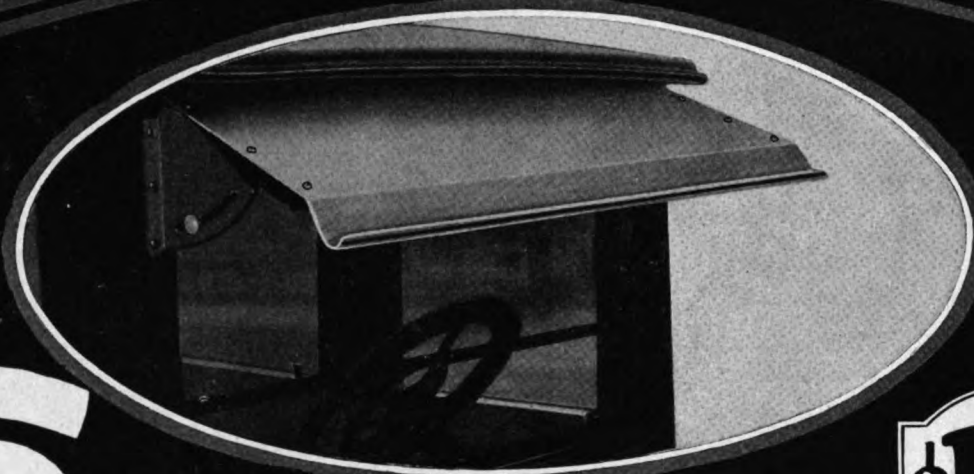
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AND
Wayne Rapid-Rate
Water Softening Systems
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\$10

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Absolutely Rust Proof*
No Glass to Break....
No Reflection.....
No Fabric to Tear...
Gutter Carries off Rain

*Ask Us
to Show
You One*

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Equipment—Good Mechanics—Work

Are "Magic Three" That Brought This Man Success—Best and Most Complete Equipment Purchasable, Systematic Division of All Departments and Work and a Receptive Attitude Towards New Ideas Were Important Factors

By K. H. Lansing

Walter J. Buck owns the handsomest garage in Tacony, an industrial suburb of Philadelphia, with some 18,000 population. He has three mechanics in his employ, works hard himself, and it's a safe bet that all the denizens of that place who are not bedridden, or in jail, know that Buck sells automotive equipment.

How do they know? Trust young Buck for that! He not only believes in carrying a message to Garcia, but has adopted the 1922 jazz principle of making Garcia read the message while he is shuffling along the tarvia.

Buck also believes in the coinage of silver—into his own till, in the ratio of two to one—two well-arranged show windows to every gasoline pump, where such an arrangement is possible. He has ten departments, as follows:

Storage, general repairs, truck agency, battery agency and repairs, vulcanizing and retreading, tire agency, accessories sales, parts sales, service department for cars, and a touring car rental service.

Before starting a vulcanizing department, he sounded out the possibilities of such an arrangement, and when he found they were good, he took a practical course in vulcanizing and tire retreading and then put in his machines. Now he has more of this sort of business than he can attend to in his own shop.

Built of brick and stone, in highly ornamental style, Buck's Tacony garage has a wing on either side and a large central driveway. On the right-hand side, as one enters, is the well-

stocked accessories department and general salesroom.

This department occupies a space 18 feet by 22 feet, and has two well-dressed and frequently-changed show windows. Two extremely wide and tall display cases, containing a comprehensive showing of small automotive equipment units, are arranged as counters in front of a battery of bins for parts and larger accessories which occupy one entire wall and reach nearly to the ceiling.

The stocks are well selected and include virtually all the popular brands of articles found in the usual city accessory and parts shops. Buck has

Tacony Garage Departments.
Storage for passenger and commercial cars.
General repairs on cars.
Battery agency and repairs.
Motor truck agency.
Tire agency.
Vulcanizing and retreading.
Sales of automotive equipment.
Sales of parts for passenger cars and trucks.
Service department for Ford cars.
"On call" touring car taxicab service.

familiarized himself with selling accessories, as well as with vulcanizing and general mechanical work on cars, and is apt to leave one of these jobs to dart behind the counter to wait upon a customer.

His mechanics, also, are good salesmen and do their share in this line

when not otherwise engaged. Ford parts are among the principal stocks in one section and there are also parts for other cars and for International trucks. Tires also have a small separate section and oils and greases for lubrication are carried.

Out in front of the garage stand large gasoline pumps, topping two 550-gallon tanks underneath the pavement. "Get the pumps set as bang-up against the show windows as they can be and see to it that the windows talk in a loud tone of voice, so to speak, about the goods inside," is one of Buck's big ideas.

In this way, those who stop for gasoline are sure to note the windows. Sometimes the architect of a garage or an accessory store may also become the architect of the shop owner's fortune.

**Windows and pumps,
Windows and pumps,
When a shop has 'em
The dough comes in lumps.**

Another thing that accomplishes sales in much the same manner as the gasoline pumps is the free air standpipe with tube, placed at the curb for the benefit of customers. Above the double doors is a wide stone slab bearing the name of the garage, while at right angles thereto swings a large sign which also bears the name of the garage.

This sign—supplied by one of the large oil companies—is brilliantly illuminated at night. Whether the prospect or customer is approaching the garage direct from the front, or passing by, he cannot fail to be impressed by

the signs and the name of the garage.

On the left-hand side of the building, as one enters, is the vulcanizing department, unusually well equipped for a garage. The department has the same amount of space assigned to it as the sales department, but it has a single, oblong show window in which are displayed enough tire repairing devices to advertise the business of this particular section. There are also batteries and battery parts shown here. Buck is agent for a battery and does recharging and makes battery repairs, at which he is an expert.

In this department are a Lowell retreader, with tube plate; cutting-down and building-up tables; test baths for leaks; air and sand bags; buffing wheel; material rack; spreaders; bins for tire repair; battery repair tools and plenty of tire hangers.

The garage space accommodates, ordinarily, from 45 to 50 cars a night, although as many as 65—both passenger and commercial vehicles in the lot—have been stored here overnight without crowding.

The building has a depth of 165 feet and a frontage of 50 feet. Care is taken in arranging the cars for the night, the trucks being so placed that they can be moved out easily the first thing in the morning, without having to disturb the passenger cars.

Before checking out the different vehicles, they are carefully examined by some one in the garage to see if they need any repairs, adjustments, or any parts or accessories which could be suggested to the owner. Many sales are made through such suggestions. This applies to tires, as well as to parts and general automotive equipment. When the owner or driver comes for the vehicle, suggestions are made unobtrusively.

At the lower end of the garage, beneath large windows, are ranged completely equipped work benches, with tools and bins for them. While there are no large or heavy machines for repair-work here, there is so much good small equipment and the mechanics are so efficient that results are about the same. There is an oxy-acetylene welding outfit. Hauck torches which are used for

straightening axles and even frames, and an air compressor run by a half-horsepower motor and plenty of bench vises.

Buck has the division of work among the men, including himself, down to a

cars are rented out by Buck for this purpose. Transportation, by steam and street railways, to some points in the vicinity of Tacony to which there is considerable traffic, is not all that it might be and this is where Buck's taxi service comes in handy.

Buck, who was formerly an employe of the Bell Telephone Co. in Tacony, is always in a receptive mood for new ideas in his line. He conceived the idea of entering the garage business through the telephone company having a car stored in a garage where he used to work on it occasionally.

The fact that the Tacony garage is on the chief business street of that suburb—Lonshore street—and is close to

the main street car and motor traffic highway leading to metropolitan Philadelphia—Torresdale avenue—brings to its doors much trade that otherwise would have to be sought laboriously to keep business at high tide.

Omaha Automobile Trade Association Announces Annual Show.

The Omaha Automobile Trade Association has announced that the 18th annual Omaha automobile show will be held in the Municipal auditorium, during the week of February 26 to March 3, 1923.

Passenger cars, trucks and accessories will all be included in the exhibits at this show.

Commissioner A. B. Waugh has been reappointed as show manager.

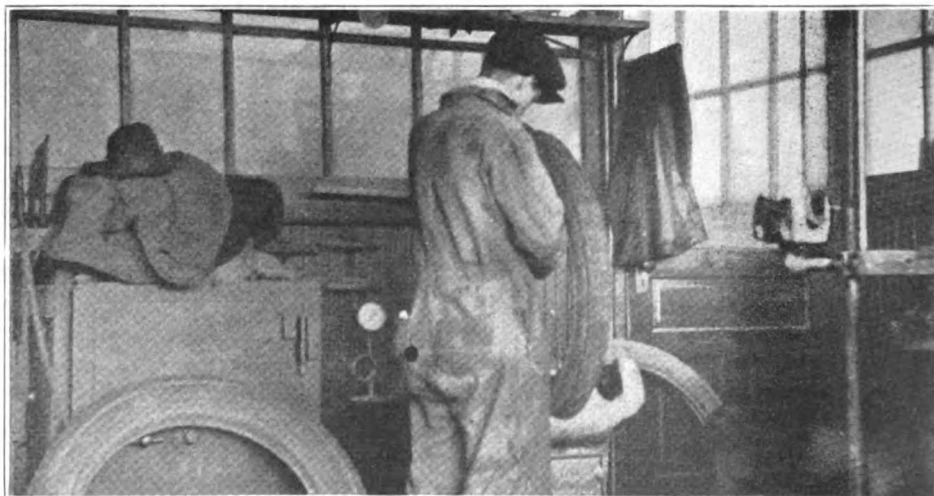


Gasolene Pumps and Well Dressed Display Windows Work Nicely When Close Together.

fine point. Usually there are four at work in the place and the day's program is always mapped out so that, as far as possible, there will be no "crossing in" of one man's assignment with that of another. Any one of them, however, may have to leave a job temporarily, to sell something in the shop and there are always times when unforeseen occurrences take place in the garage business. However, plans are adhered to as closely as the work will permit.

A reconstructed touring car is used as a service car. It is fitted out with jacks, towing chain, a spare tire and hand tools.

An important, moneymaking department of the business is a sort of "on call" taxicab service. Ford touring



Vulcanizing and Retreading Department is a Busy One in Tacony Garage.

Making Estimates of Repair Costs

"We Estimate Squarely and Fairly Costs of All Repairs, Material and Time Required, and Give This to the Prospective Client Before Turning a Hand in Actual Repairwork," Says Garageman—Customers Like His System

By Felix J. Koch

In the heart of the Mid-West, a garageman named Shaw has been attracting considerable attention and no little not-altogether-friendly envy on the part of his competitors, because of the stupendous business which has come his way as a result of novel estimating methods employed.

Starting with a bit of a garage—the best the funds then available would permit—Shaw has been expanding and improving his place of business and his equipment. Now that the city garage is all that he can, for the present, make it, he is preparing to develop business still more and to open companion garages in the smaller towns of the surrounding territory.

Shaw has, in fact, come to be regarded as pretty nearly an authority on garage work for small towns, as well as cities, in that part of the Mid-West lying radial to Cincinnati. What he has to say, by word of friendly advice to those who would open garages or improve existing garages, is well worth hearkening to at this time.

"Suppose," we questioned Shaw the other morning, in his offices on the upper floor of his garage, "that you were to open a garage in a good-sized town. You would have to meet the competition of all the other garages in that town and those of neighboring communities.

"You would, no doubt, advertise your coming to the place by billboards on the highways and, perhaps, by circulars sent through the mails—but that publicity must tell more than the mere fact that a new garage, run by a man named Shaw, is coming. What would you add, what feature that you believe really unique would you emphasize, in order to get business?"

"I should advertise the fact that I guarantee to provide every client with a written estimate of all costs to be incurred in any task, large or small, brought to me," answered Shaw, "and that I will not charge one cent for disassembling and making the diagnosis, or for reassembling if the prospect does not care to permit me to go on and make the repair."

What he promised seemed such a

commonplace of Anglo-Saxon business prudence on the part of prospective clients in any line that we could not fail to wonder whether there was anything that was really novel or different from what the great body of garages were doing. We asked Shaw about it and he laughed and replied:

"There are a number of automobiles in the runway yonder, waiting for us to get to them, for repairs. Every one

Maximum Accomplishment in Minimum of Time the American Spirit.

Characteristic of the American people is their restless desire to get much done in little time; to manifold as far as possible the amount the individual can accomplish; to cover much ground with little effort. This characteristic pervades their ideas of pleasure and has found in the automobile the most efficient means for gratifying it.—John Oakwood.

of them will run. Take any one you choose, go to any garage you choose, and tell them that there is something the matter with the car—you aren't sure just what. Let them give it a trial spin around the block, and then ask them what it will cost to have the automobile made ship-shape. In other words, to insert all necessary parts and make the repairs."

We hardly cared to accept the challenge. We remembered our experience with our own car when things had come to a similar pass, so we hedged and asked him to tell us what the result would be.

"They'll probably answer," said Shaw, "We'll be able to look her over some time this afternoon. It doesn't seem that there's a great deal amiss with the machine. We'll fix her up and, if you wish, we'll call you when she's ready. You ought to have her back by tomorrow afternoon."

"If you ask what the work and the parts will cost, they'll answer: 'No way to tell. You see yourself that the bus won't run. This may be because of any number of things—there's no way of knowing until we open her up.

We're as reasonable as any other garage in the place and we'll treat you square.'"

We had lingering recollections of bills which were surprises indeed, when duly rendered, and we knew Shaw spoke the truth.

"Then, what is your method?" we inquired.

"To estimate, squarely and fairly, the cost of all repairs—of material and time to be required—and to give this to the prospective client before a turn of the hand in actual repairwork," explained Shaw.

"In every garage under my control today," he continued, "we make the fullest possible estimate for every piece of work, big or little, before we touch that car to put those repairs in place. If a man finds our estimate high, or if he feels he really can't afford to go on with the work as outlined, we reassemble and do not charge him one cent."

"And how much are you out?"

"When you count such things as good-will and continuous advertising by the prospect—nothing. Instead, I am in. He feels indebted to me and doesn't like that indebtedness hanging over him, so he comes back to me with all the work he can. Besides, he sings my praises until he has repaid me times without number."

Even as we chatted, the big garage doors swung back again and again to admit cars coming in for repairs. Shaw was doing a mighty big business—evidently his theory worked.

"Just what is your method of making estimates?" we questioned.

"Let's take a typical case," he replied. "A car owner comes in—mad as the proverbial hornet at being deprived of an expected ride and advising whosoever may care to hear that the blessed car won't pull on even the slightest hill.

"While he is here, if the circumstances permit and if there aren't too many other cars waiting, we begin our work of investigation.

"We have a set form for this investigation and, even though it seems folly

to test the car for a certain fault, we do test it for every phase of motor ills possible.

"We start with the electrical system of the automobile—we want to know absolutely that the current is getting through the plugs. If it isn't, we discover the exact trouble, list the price of overcoming this and the cost of any parts needed.

"Through with this, we go into valving. We must know that the valves are closing properly—that they are holding the compression as they should. Anything amiss here is listed on the form.

"After that, we consider the check rings and, through with them, we turn to the timing. These items seldom detain the expert trouble seeker very long.

"So we continue with the rest of the mechanism of the car. It follows, of course, that we discover the cause of the specific trouble in a short time, and that we uncover a number of things amiss which are bound to give trouble by and by. We list these and the cost of making everything shipshape, to be dealt with by the customer, or not, as he may please."

Shaw believes in having one man specialize on diagnosing motor troubles, this man being called from any other work he may be doing to perform this task whenever it is needed. It seldom takes this expert more than an hour to ferret out and estimate every cause of trouble and every near cause of trouble on even the most complicated of automobiles.

The facts revealed and estimates made, results are copied on a neatly printed form. This is then made ready for the client to approve and perhaps sign. Where it is believed that a personal demonstration of his car's needs will be helpful, he is sent for and shown this statement. Otherwise, the form is mailed to him.

"Almost always, though, I prefer to have the man come in and be shown what we have in mind on the estimate," Shaw explained, pointing to groups of men listening attentively to expert repairmen near the cars on the floor beyond. "There are so many things laymen must really see to understand about their cars."

As a result of such a conference, just what shall be done is agreed upon. Repairs to be made, parts to be employed, and the agreed price for work and materials are all copied anew on a final form and this is signed by both

parties to the contract. The work then proceeds as rapidly as Shaw's experts know how to complete it.

Where Shaw is called upon to install new piston rings, remove carbon, or where the car is to receive a pretty general overhauling, he guarantees to have it back to the owner in anywhere from a day and a half to two and a half days. All estimates as to time depend largely, of course, upon the make of the car.

For actual work done on the car, Shaw makes a set charge of \$1.25 per hour. His diagnosticians can take almost any group of repairs, for almost any known make of car, and tell you the maximum number of hours required for the work. Consequently, it is just schoolboy arithmetic to know how much the repair should cost.

Repair bills paid Shaw, as a result of this system, sometimes run as low as \$2. On the other hand, they will total \$125 and much more, with the same customer, as, more than satisfied with the test work given, he returns to the garage for more important repairs.

Occasionally, Shaw has work which costs the client from \$700 to \$800. The rich residents of the town, the landed proprietors from the adjoining Ohio, Kentucky and Indiana countrysides, are coming to him and sending friends to him in increasing numbers, because they feel a certain fairness about his method of telling them, in advance, the probable cost of their repairs.

An \$800 "job," as he calls it, implies the complete overhauling of the entire mechanism of the automobile. It implies re-tiring throughout. It means a new top and repainting—in short, it means overhauling in every sense of the word. When such work is completed, Shaw delivers the car.

He gives no time guarantee for the work, for he claims that the time any repair will last, if it is done right, depends upon the driver. However, for what the most lenient would call a reasonable time, he will keep that machine in repair, free of charge.

"Roughly speaking," says Shaw, "if you've had us overhaul your car, we will make, free of cost, any repair not due to deliberate carelessness, wreck, or similar accident, until the speedometer shows you have used the car for 1,000 miles. We believe that is a fair test of our work."

Shaw has introduced many innovations into his garage, which help him to reduce the time required to make

repairs, and thus reduce the costs for time which a customer must pay.

He does not believe in specializing in parts necessary to certain makes of cars. There are altogether too many parts, each adapted to just about one make of machine, to make this pay, he stated. Instead, he prides himself upon a prodigal use of the telegraph, fast mail or express, to bring him just what he desires when he cannot get these things in his own town.

"We've worked out our anti-time-stealing program in pretty much this way," Shaw said, as he led to what seemed to be a miniature telephone exchange.

"We depend upon innumerable telephones to keep the office advised of the progress of work on each car. Notice returns coming in on this switchboard.

"Every man in my employ holds a specific number, by which he is known in all matters concerning his work.

"Every repair job, big or little, is numbered and is known by this number. Jones, coming in with his car just now, may become No. 175, for this day. Roosa, who succeeds him down the passage, becomes No. 176.

"Our diagnostician, the superintendent of the repair department, examines Jones' car. He finds that all it needs is to have the spark-plugs changed. He hands Jones the estimate and they agree upon the price for work and parts, and the contract form is signed. It all takes much less time to do than to tell about.

"The estimate in hand, the superintendent calls repairman No. 7, let us suppose, to proceed with the work. Repairman No. 7 has just finished with job. No. 75. He is told exactly what is wished of him on this next car. In addition, he receives a duplicate of the estimate given.

"Repairman No. 7 asks any questions he may believe essential. Then he goes off to the work assigned. He has the car brought to the most convenient point for the work, and then he stops and telephones the operator at the switchboard to the effect that he is starting on the work.

"'No. 7, off job 75, onto job 175,' is about what he will say.

"Automatically, the operator 'rings out' work time on job No. 75 and begins to charge time against No. 175. This simplifies timekeeping and book-keeping. Job 75 ceases to be charged with time, the Jones car begins its account, the time-clock prints the

(Please turn to page 14.)

Sum Pages from a Chauffeur's Dyerie

Ekonomy's a Good Thing but It's Gone to Seed with the Missus—I Told Her I Thought It Wood Be Cheap in the End to Get a Hole New Set of Tires but It Didn't Make Enny Impression—Purdy's Letter Did Though

By Frank Farrington

I spose ekonomy is a good thing but I think its kind of gone to seed in the Missis' case. Now take tires, for instance. She beleevs in using tires til theyre wore out—thats all she wants, just to have em wore out before throwing em away. When theyre blowed open all the way around and part way back, she don't care a cent what you do with em, but generully, by the time she gets reddy to kiss a case good-bye, its looking like a string of seckond handed overshoes.

The junk man wont even cum around and look at our old casings enny more. He says they aint enny market for rubberless old shoes. Why, sum days when weev bin on a trip, its reminded me of feeld practis in the artillery camp where they had the best gard house I was ever into. Its generully a question whether the spares will blow out first or the ones weer using. All Ime afraid of is that sum day the whole four is going to go at one time and that wood lift the car up so high it mite get into a tale spin cumming down.

I told the Missis one day I thought it wood be cheep in the end to get a hole new set of tires before we broke our nex and she sed that ekonomy is welth. I sed Ide rather not be so welthy than be so ded I coodent enjoy it, but that diddent make enny impression as I could see.

But I was talking to Purdy one day and he said: "James, leev it to me. Ile sell the Missis a new set of tires or bust a gallus." I said to go to it and Ide buy him a new pair of galluses if he needed em. It was worth trying anyway.

And heers a letter he rote the Missis. I can copy it just the way he had it. He rote it personal himself. It was-sent an advertisement a tall.

"Dear Madam:—Speaking about automobile tires—what an expense they are! "Just take the inner tubes for instance. In the size you use, a set of four costs about thirty dollars. If you let your casings wear down until they blow out badly, you will probably have to have new tubes as well as casings.

"May we suggest that by laying aside your nearly worn out casings and putting on new ones before the final blow-

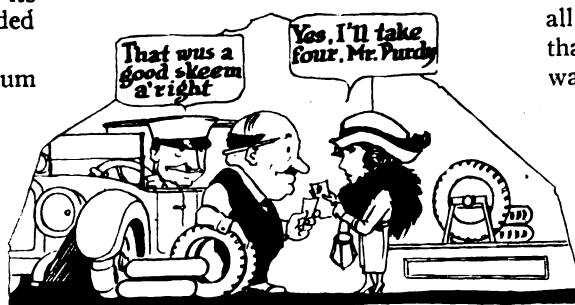
out, you will save pretty nearly the price of one casing?"

"In other words, by getting a new set of 4 casings now, you save the equivalent of a 25 per cent discount.

"This is without saying anything about the time and inconvenience saved, as well as the improvement in the looks of the car.

"We are making a special offer on Longwear tires now in sets of four. Can you stop and see them soon?"

I call that a pretty smooth letter, and



"First I Knew the Missus Stopped at Purdy's and Bought 4 New Casings."

I know it is a good one becaws it worked. The first I knew, the Missis wanted to go by Purdys garaje and she talked to him and he got an order for 4 new casings.

He told me that skeem of offering a special price on a compleet set was a good one. He told folks he wanted to get as many cars as he cood, all equipped with Longwears all around, and so he was willing to give em a special price. And he said he just about got his profit on three of the shoes and broke even on the fourth, so it paid pretty good.

When the boss cum out one morning and seen the new tires all on the car, he grinnd and said: "What has happened, James? Have you made us a present of a set of tires soze you cood have the old ones for sooveners?"

I told him no, that the Missis had decided, after talking to Mister Purdy, that it wood make munny to get new tires.

"Oh yes, I did see that letter from Purdy," says he. "James, that is what you call a sampel of applide sikology and dam good bizness."

I dont kno anything about sikology or what it is, but I kno what good biz-

ness is and I gess Purdy knows too. Anyway heez got a good bizness and he keeps it getting bigger all the time.

One thing about this man Purdy, he don't have any quarrels with anyone. Ive gone in there once or twice when I was pretty hot under the coller about sumthing I thought heed dun rong about the car or sumthing. Well, heed cum out with a smile and heed lissen while I started in to dam him off and all the time he took it so good natured that I coodent stay mad, and heed always start in by saying mebbly I was rite and heed always end by my seeing what they was about it and mebbly heed made a mistake and mebbly I had, and if he had he was reddy to make it rite.

You see I notis that becaws Ive bin in a lot of garajes, and in sum of em you get just about as pleasant treetment as youd get from the top kick when youve bin A. W. O. L.

I spose its natural for sum garaje fellers to be crabbers becaws they think theyre more mekannics than salesmen and they kno they look all black and like the devil, so they think whats the use of trying to be anything but a mekannic anyway? Thats why every garaje ought to have one feller anyway thats cleened up and dressed neet and can meet fokes like a bizness man, not like a chimbly sweep.

I had to go over to Pikes and get sum gas the last thing tonite and Pike said: "Why dont you get more of your supplize heer Ide be glad to see you get your rake off all rite."

I said: "I don't want no rake off. Youre barking up the rong tree. I get paid a good sallery and if I wanted more Ide ask the boss for it, not you. Whats the matter you dont get more bizness is you aint got 'Welcome' on your mat, and you aint got it on your map eether. You act like you dont give a dam if anybody does bizness with you or not."

I said that just as I drove off and I aint going to rite heer what Pike said to me. Ile bet he never red it in no book. He must of bin a mule skinner in the army from the way he talked.

Making Estimates of Repair Costs

(Concluded from page 12.)

record made, and even the most suspicious client is absolutely satisfied, in the end, that he must pay only for such time as his work incurred."

Similarly, Shaw has brought things to a fine point in keeping track of the supplies—particularly the parts—used in making things ship-shape about the car.

"As new parts are required about the car he may be bringing into shape," he explains, "Mechanic No. 7 will call upon the superintendent for these. He must make his requisition in writing always, so that we may charge the client from them.

"The superintendent, approving, sends the stock-boy to the stockroom to get what is wanted and to deliver the things to the mechanic needing them. Checking them over, No. 7 signs a receipt for all. The form is taken by the boy to the stockkeeper, who also signs it. It is then returned to the superintendent for his signature. From this record, there can be no ap-

peal. If a part is lost in the process of the work, it is not hard to locate or, at least, the person who last signed for it and who is, therefore, responsible for the loss. The car owner pays only for parts put into the car."

It sometimes happens that the original diagnostician, having received the client's approval on the estimate of work to be done for him, wishes this work done in some specific way. Or it may happen that the client insists on certain preferences in parts, in the placing of these, or in just how certain mechanisms shall "run."

In that event, when the car is about to be turned over to the first mechanic to take it in hand for repair, a so-called "instruction sheet" form is filled out with all instructions believed necessary. This is placed in a convenient holder fitted, for the moment, to some place on the car most accessible to the workman while making the repairs.

This instruction sheet follows the work through, step by step, to its com-

pletion. When final reports on the completion of the job are ready, it goes into the envelope reserved for these. Eventually, that envelope reaches the bookkeeper's desk, numbered with the serial number of the stated piece of work. On it, too, is shown the time which the time-clock indicated as marking the conclusion of the task.

There can be no mistake when making out bills. The cards used in connection with the time clock show exactly when the last mechanic concerned "reported off" the given piece of work. The sheet of special instructions, written in the presence of the client, shows this time report in the mechanic's handwriting. The original estimate told the customer what the work would cost, and just a little more. Shaw likes to over-estimate a very little always—it leads to excellent feeling when repairs cost less than was supposed.

The customer pays on presentation of his bill, for Shaw will extend no credit.

Another Record-Breaking Show

"Better and Bigger Than Ever," Say All Visitors to Automotive Equipment Association's Convention and Show Held in Chicago During the Week of November 13-18—Results of Merchandising Campaign Outstanding Feature

The Automotive Equipment Association has had an enviable record of accomplishment ever since the beginning of the organization—and this year's convention and show, at the Coliseum in Chicago, November 13-18, has established a new record for, in attendance, harmonious accomplishment and the splendid success of the show, it must take precedence even over the many other remarkable achievements which characterize the history of this association.

As was previously announced, the show this year was a "closed show," being for members of the association and their representatives only. Nevertheless, the largest attendance ever assembled at an A. E. A. meeting was reported, the record being the Thursday session when 1,327 gathered in the annex of the Coliseum.

Not only was this year's show the largest yet held by the A. E. A., but the business exhibits also appreciably surpassed those of previous years both in size and attractiveness. Exhibits by 215 manufacturers were shown and the demand for space was such that it was found necessary to cut down the allotments of the larger exhibitors from four to three and three to two spaces.

And these exhibits were thoroughly representative of the automotive equipment industry—displaying garage equipment, including heavy machinery and lighter tools; accessories for the car and truck; replacement items for all parts of the automobile and tools for resale to the motor vehicle driving public.

Trade conditions were reported as improving steadily in nearly all parts of the country, and most of the jobbers agreed that there is reason to confidently expect that the gains in business recorded during the past few months will be continued during 1923. Many jobbers reported 10 to 30 per cent more business, in tonnage, for this year than in the same period of 1921, purchases of garage equipment having been increasing for several months.

Manufacturers expressed themselves as highly pleased with the results and volume of business booked at this year's show, as well as the friendly feeling that was shown. One large manufacturer reported the booking of sufficient business to operate his plant at full tilt until next July.

The reports of the splendid results accomplished by the merchandising campaign

formed one of the most inspiring features of the convention. A number of jobbers told of increased sales in some lines of equipment, running as high as 100 and 200 per cent, as a result of sales promotion co-operation with their dealers. Two dealers who were called into the convention as guests told how they had built big, profitable, automotive equipment businesses in small towns after jobber salesmen had shown them the possibilities.

Merchandising Director Sherman made the recommendation to jobber members that they institute a campaign to assist dealers in building up their automotive equipment business, urging that each jobber's sales manager arrange with his salesmen to select one dealer each as a likely prospect for intensified assistance over a six months' period beginning December 1. The salesman would pay particular attention to this dealer's sales work, helping him in the selection of seasonably salable merchandise, display and demonstrate and ask motorists to buy.

Mr. Sherman said that if 1,000 of the 4,000 salesmen with jobbing houses of the A. E. A. would carry out the plan sug-

(Please turn to page 35.)



Current Comments and Observations

By The Editor

Business Continues Upward.

Notwithstanding the persistence of conditions, both domestic and foreign, which affect adversely our industry and trade, and with allowance for the usual seasonal influences, the main trend of business continues upward.

As compared with the actual return from last year's principal crops, the estimated value this year is from one billion to two billion dollars more. This represents an important increase in the buying power of the farmers.

Railroad traffic on the western lines is 5 to 15 per cent above last year's. The grain traffic is the largest in recent years. It is seldom that it is as heavy as during the past few weeks. Farmers are not selling corn freely and the country shippers are getting more cars.

Employment of labor showed the greatest expansion in November of any month since last January. The United States Employment Service of the Department of Labor early this month stated that "all manifestations point to a steady upward trend in employment."

Observers of the trend of conditions affecting the business situation predict that car and labor shortage are likely to present the two most pressing problems to industry in the immediate future.

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Lessons and Trends.

As the year closes, leaders in the industry review the events and happenings of the year, and draw conclusions as to lessons learned and the trend of the industry. The Motor & Accessory Manufacturers' Association summarizes the main lessons of 1922 as "Safety, Sanity, Stability."

Almost all of the executives point out that the automobile industry, through the reduction of prices and through the perfection of producing efficiency to meet real transportation needs, is today on a sound, stable basis, having successfully come through the periods of boom, deflation, and readjustment. The safe and sane level has now been reached in their opinion.

A continuation of keen competition in the industry during 1923 will strengthen the well-established, well-financed and well-managed companies, but will put many of the weaker ones to the final test. This is an outstanding conclusion based upon the replies received by General Manager

The Real Executive.

Knowing people and knowing how to handle them is, I believe, the greatest asset of any executive. I always sought a man who was anxious to land the job. The fellow who is overjoyed to get a certain job is the one who will work hardest at it. I never like to employ a man who is not sure he wants what I offer him. When a man takes a job with the air of doing me a favor to accept it, I know that he is apt to think that he has discharged his full obligation in taking the place, without doing much afterward.

In order to obtain a man full of enthusiasm for the work to be done, I often found it wise to pick somebody from a much humbler place. The man who has been making a monthly salary of only \$75 is likely to leave no stone unturned and no midnight oil unburned to make good on a job paying \$150—much more likely than if he had already been getting almost that much.—Thomas E. Wilson

M. L. Heminway of the association to the questions he submitted to the organization's members.

Throughout all of the replies runs the firm conviction that the automobile industry, as a national transportation necessity, has demonstrated beyond doubt its fundamental vigor and resourcefulness.

The forecasts for 1923 point out the trend towards making motor cars genuinely complete and ready for use in every detail—in order to enhance the comfort, ease and economy of operation.

Other features which will probably be stressed, according to advance indications of the New York and Chicago automobile shows, are:

Continued swing toward greater production of light sizes; preponderance of closed cars; emphasis on sport models; further

emphasis on light weight construction; tendency to lower the cars, thus giving a racy appearance; effort in direction of simplification of design; and greater engine efficiency.

* * * *

It's a Common Interest.

This winter again sees the assembling of state legislatures for the grinding out of the usual grist of laws—some good and many not so good.

The automobile and its users will undoubtedly come in for a good deal of attention from the law-makers of the various states. Some of this legislation will be directed against the car owners, car equipment, garagemen and dealers. Back of it all will be abuse or fancied abuse which has been brought to the attention of the legislators.

The average citizen owing to the prevalence of accidents in which fast or reckless driving are the chief factors may voice a demand for legislation restricting the speed which may be developed by the engines in the hope of curbing fast traveling.

Manufacturers, dealers, jobbers and garagemen are all vitally interested in making the automobile the safest method of transportation. While the effect of accidents upon sales is negligible, at present, the accumulated force of abuses resulting in accidents may in time have a most serious effect upon the industry.

Hence everyone in the industry has more than a passing interest in the activities that will be carried on in the legislative halls this winter.

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1922's Record Production.

This month closes the greatest production year the automobile industry has ever experienced. For nine consecutive months the output of motor cars and motor trucks has exceeded the 200,000 mark.

The prediction is freely made that the figure at the end of this month will show a banner production record for the year of 2,500,000.

So the automobile industry has lead the way on "the Return to Prosperity."

Selection of Equipment for Tire Shop

Selection of Equipment for Tire Shop Influenced by Various Conditions Which Include the Volume of Business and Kinds of Repairs Most Likely to Be Encountered—Some Suggested Items Are Discussed in This Article

By H. J. White and Lowell R. Butcher
Instructors in Automobile Trade School, Des Moines University

The selection of equipment for the shop will be influenced by various conditions. The volume of business must be considered, as well as the kinds of repairs most likely to be encountered. If truck and heavy duty tires are to be repaired, it may be necessary to include equipment to handle up to 8-inch tires. However, the repairman selecting his initial equipment will probably provide for the repair of tires up to only 5½ in cross-section.

There are several different types of vulcanizing outfits on the market, namely, the air-bag type, the type using rubber blocks and the outfit which cures tires by the wrapped method. As the air-bag method of cure is more generally used, and is suitable for smaller shops, only this type of equipment will be described.

For sectional repairwork, several molds will be needed. The average shop, which does not attempt the repair of the heavier truck tires, will need sectional molds for tires from 3 inches to 5½ inches. These may be separate, double or en bloc. Manufacturers vary as to molds manufactured. Some makers list molds in which a single cavity will take two sizes of tire, while others have a separate cavity for each ½-inch of tire size. Thus the molds used for tires from 3 inches to 5½ inches may be from three to six in number.

The cross-section of the mold will indicate the size or sizes of tires that may be cured in it. A mold measuring 3¾ inches across will take either a 3½-inch or a 4-inch tire. If it should measure 3¼ inches at this point, it will take 3-inch or 3½-inch tires. A measurement of 3½ inches indicates that only one size of tire, the 3½-inch, may be cured in the mold. The table of

mold measurements given in this article can be followed in calculating the size of tires that a particular mold will take.

Sectional molds are usually made in quarter or fifth-circle sizes. The quarter-circle molds are longer and will take a longer sectional repair. A quarter-circle mold for a 3-inch or 3½-inch tire will be a little over 27 inches long, while a fifth-circle mold for these same sizes of tires will be only about 18 inches in length. Other tire sizes are correspondingly longer, according to the diameters of the tires.

If retreading is to be done, the mold equipment will include several third-circle molds. Probably molds which will take up to 4½-inch tires will be sufficient to take care of all ordinary work. Usually a separate cavity is required for each ½-inch of tire size. Sometimes fillers are used, where-

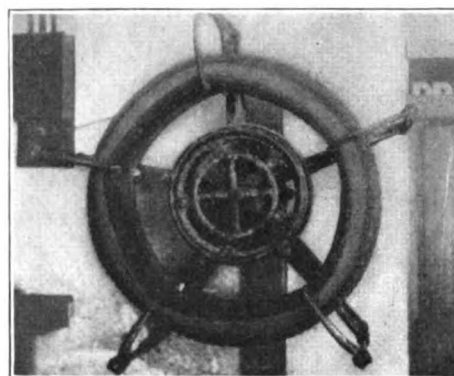
Mold Measurement

| Ending— | Takes— |
|-----------------|-------------------------------------|
| ¾-inch | Even and next half size. |
| ½-inch or even. | Size tire indicated by measurement. |
| ¾-inch | Half and next even size. |

Table of Tire Sizes for Different Molds.

by a large cavity may be reduced in size to cure a smaller size of tire. If the molds do not permit such adjustment, four sizes of retread molds will be needed—3-inch, 3½-inch, 4-inch, 4½-inch. Larger sizes might be included, but the expense would not be justified unless much heavy tire retreading is to be done in the shop.

Inside-arm vulcanizers for handling inside work should be included in the equipment. Some manufacturers make one size of arm which will take from 3-inch to 5-inch tires, while other makers produce molds capable of taking only two or three different tire sizes. No matter what type is used, the inside-arm equipment should take up to 5½-inch tires. The best inside-arm vulcanizers contain



Tire Spreader Valuable for Inspecting Tires.

large steam chambers, yet are heavy enough to hold the heat.

Tube plates come in different sizes. They will be from four to eight inches wide and from 20 inches to 54 inches long. The 54-inch length has a capacity of about ten tubes. The ordinary shop will require a capacity of about six tubes. A tube plate may be on a separate stand or attached at one end of the sectional molds.

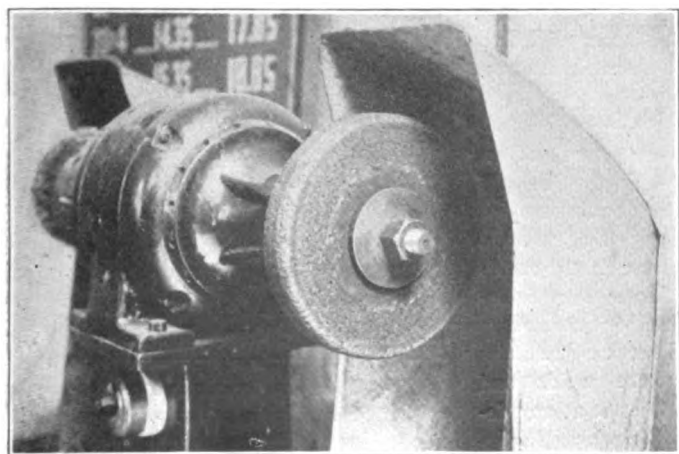
Some tube plates have special quick-acting clamps for holding the tubes to the plate while others use C-clamps or weights for this purpose. Individual preference will govern this factor in choosing the tube plate.

Bead molds usually come with the sectional molds. These should be in shapes suitable for either clincher or straight-side tires. The clincher bead molds are seldom needed for tires larger than four inches. Bead molds may be either of aluminum or cast iron. Aluminum—because of its greater heat conductivity—is preferred by most repairmen, although more expensive.

Bead spacers are used between the two halves of the bead molds, usually, when curing oversize tires. One of these is needed for each set of bead molds. These frequently come as additional equipment and must be purchased separately from the other mold equipment. Adjustable molds will not require these spacers.

Reducing shells are sometimes used in a large mold to reduce the size of the cavity for a smaller size tire. This is a machined metal form which fits inside the mold, reducing the size either ½ inch or 1 inch. Probably these will be purchased with the sectional equipment and due allowance in the number of cavities made. Like the bead molds, these may be either of cast iron or aluminum.

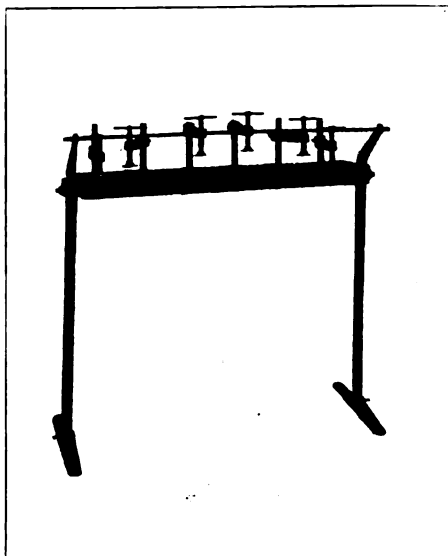
Pressure bars are needed for use with



Buffing Equipment Directly Connected With Electric Motor.

the retread molds. One for each mold is all that is needed. They are purchased as a part of the retread equipment.

Boilers, for supplying the steam to the molds, are of two general classes, the flue



A Separate Tube Plate.

boiler and coil-type heater. In the flue type, the heat passes upward through tubes or flues which are surrounded with water. The coil boiler has a coil which carries the water, the heat passing about the outside of the coil.

Fuel for the boilers may be coal, oil or gas. Possibly the gas, as a fuel, is preferred. Using this kind of fuel, it is easy to use automatic regulators in connection with the boiler, which regulate the intensity of heat in proportion to the boiler pressure.

Common sizes of flue boilers are from four to ten horsepower capacity. A four horsepower boiler will take care of ten molds, a tube plate and two inside-arm vulcanizers. Very few small shops will require any larger boiler than this—in fact, no larger boiler than is necessary to handle the mold equipment should be used. Mold manu-

facturers will recommend the sizes of boilers needed for their different types of equipment.

It is best, whenever possible, to place the boiler in the basement. This allows the gravity or return system of steam circulation to be used. The steam passes out through an outlet in the top of the boiler, circulates through the molds, and any condensation is returned to the boiler through an inlet at the bottom of the boiler. A check valve is needed at the boiler inlet, and allows the water to return but keeps the steam and water from blowing back through the return line.

The burner used in connection with the boiler will depend upon the kind of fuel available. Gasolene, or city gas, is most commonly used as fuel. A city gas burner greatly resembles the ordinary gas plate, usually having some sort of gas regulator which shuts off or decreases the gas supply when a certain boiler pressure is reached.

Gasolene burners are very similar but, in this case, the fuel is vaporized by heating or generating the plate. Control is usually manual.

Oil burners may be had, but are not commonly used. Usually these must be ordered special from the boiler manufacturer. The boiler using coal will have a grate which takes the place of the burner.

A steam gage will be needed at the molds, as well as at the boiler. This should register up to at least 80 or 100 pounds of pressure and should be placed as near to the molds as is possible. A thermometer is used as a check against the pressure gage. It is placed at the inlet side of the molds in the high-pressure steam line. One which has some sort of protecting shell is preferred.

If it is impossible to place the boiler in the basement or below the molds, the non-return system of steam circulation must be used. Non-return systems require the use of a trap, which collects the water of condensation at the lowest point in the steam line. These traps collect the water from the line and discharge it into the sewer without loss of steam. Several different styles of the trap may be had, any of which will give satisfaction if installed according to directions.

Some sort of a regulating valve will be very convenient for keeping the steam pressure at the molds uniform. This is installed in the steam line between the boiler and the molds and may be set at any desired pressure. For instance, if it is de-

sired to have a 50-pound pressure for curing and the boiler carries 80 pounds of pressure, the valve may be set at 50 pounds and will keep the mold pressure at that height unless the boiler pressure falls below 50 pounds.

These may be purchased in a variety of styles, the pressure on some being adjusted by shifting a weight on a lever while others regulate the pressure by means of a spring.

Air bags are needed for keeping the tire shape while curing in the sectional mold. One for each size of tire up to 5½ inches will be needed. These may be had in

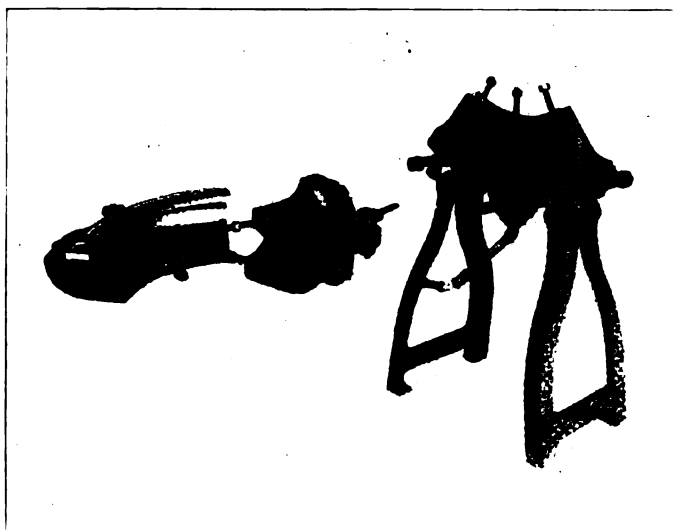


A Flexible Tube Buffer Which Carries a Small Emery Wheel.

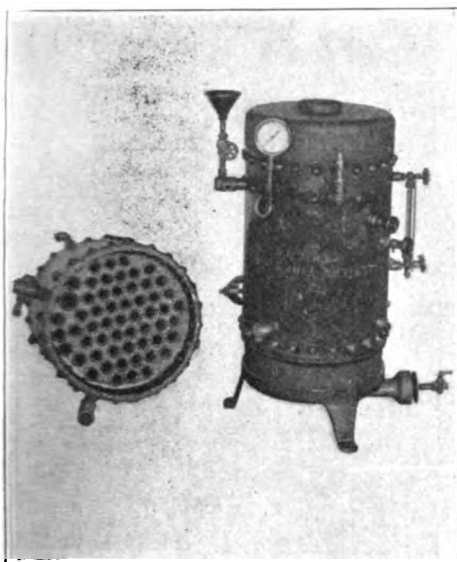
lengths that vary. An air bag should be slightly shorter than the mold in which the tire is cured. Accordingly, the lengths used will depend upon whether the quarter or fifth-circle molds are selected. Only the best air bags should be purchased. Cheap bags soon develop leaks and their purchase is false economy.

Retreading will require sand bags or some filler to give internal pressure during the cure. Sand bags are quite often used and may be either purchased or made. The purchased bag will come empty and the repairman will be required to fill the bag with fine sand. Sand bags should not be filled too full or one size of bag will not handle two sizes of tires. Three bags will ordinarily be required.

Of course, the shop will be equipped with some sort of an air compressor. A pressure tank will be in connection, as will some means of supplying power to the compressor. Several outfits on the market have means of automatically keeping the air



An Adjustable Sectional Mold.



Showing a Flue Type Boiler.

pressure of the tank at any desired point. Almost any reliable make will answer the purpose of the small shop. A pressure of 120 pounds is usual for tire work.

One buffing stand is usually sufficient. Some tire men use a coarse emery wheel for roughing work, but the majority seem to favor a rotary rasp in connection with a wire-brush wheel. Six to 8-inch wheels, traveling from 1,800 to 2,000 revolutions per minute have been found to give good results.

An electric motor, if electric current is available, is used for power. It is possible to secure a self-contained outfit, with the motor directly driving the buffing wheels. From $1\frac{1}{2}$ to 2 horsepower will be required to drive the buffer. The flexible tube buffer has become very popular among tire men. In some cases, repairmen have dispensed entirely with the ordinary buffing equipment and do all buffing and roughing with this equipment.

Very few of the modern shops can well afford to be without a tire spreader. The type selected will depend upon the capital

available. Spreaders may be had in types and kinds that vary greatly in price, some costing as much as several hundred dollars.

A fabric skiver for skiving the edges of boots is a time-saver. If the repairman plans to make his own repair boots from old carcasses, the expense of the skiver is more than justified. Of course, if prepared boots are used, there will be no need of this piece of equipment.

A tire changer, for mounting heavy tires on split rims, can be used to good advantage if much changing work is done. There is little danger of battering a rim or bruising a tire if a changer is used to mount the tires. Whether this equipment will be included will depend upon the volume of business handled.

A tank for testing tubes for leaks is needed. This should be 8 ins. to 10 ins. deep and $2\frac{1}{2}$ ins. to 3 ins. long. It may be purchased or made to order by the local tinsmith. A circular testing tank, in which the entire tube may be immersed at one time, may be used. This takes up considerable space and is not recommended for the small shop. The testing tank should be mounted on a small bench so that the top of the tank is at a convenient height. Thirty-six inches from the floor is about the right height for the top of the tank. A hook, or some means of supporting the tube while testing, should be about 24 inches above the top of the tank.

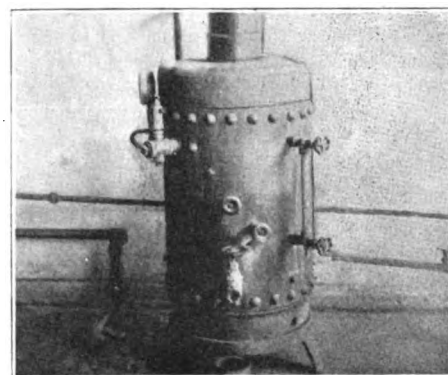
The steam bench should have a top about four feet wide and five feet long—32 ins. to 34 ins. will be a convenient height for the top of this table. It is used for preparing the tire for the mold. A shelf underneath may be used for storing bead plates, bead molds, clamps and other curing tools. The bench should be placed conveniently close to the molds.

The cutting-down bench is used for all cutting-down work. Its size will depend upon the size of shop. The height from the floor will be slightly higher than that of the steam bench. A height of 36 inches is about right. Convenient racks for knives,

tools, etc., will be needed. Mandrels for holding tires should be at least four feet apart. A bench six feet long and three feet wide will accommodate four cutting-down mandrels—two being placed on either side of the table.

The bench on which the building up is done should be located as far away from the buffer as possible. The dimensions are about the same as for the cutting-down bench—the size used depending upon the number of men working at the bench at one time. The tread roller may be mounted at one end of this bench. This piece of equipment is used for rolling the new gum of retreads firmly into place.

The bench at which the tube work is done may be a small table. Small boards, eight inches wide and one inch thick, which slide

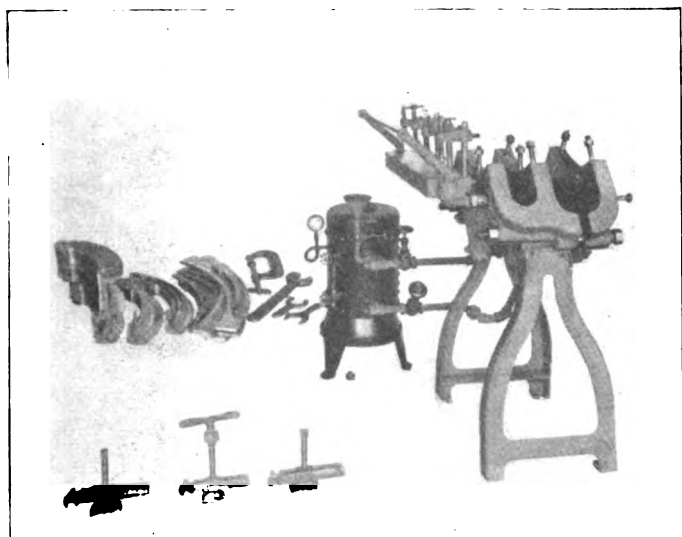


Boiler Installed In Non-Return System.

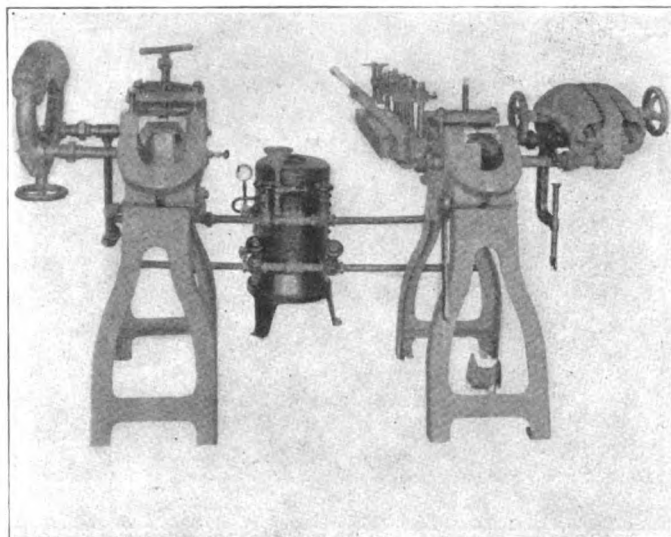
out and in under the table top, are used for holding the tube during repair. Cementing is sometimes done at the tube bench.

Racks will be needed for drying and storage. One track will be needed for storing repaired tires, another for tires to be repaired or partially cut down, and a third for holding tires while drying or tires that are ready to be cured. This drying rack should be built so that the tires are suspended from a hook. Racks may be constructed in a number of different ways. In-

(Please turn to page 35.)



Small Vulcanizing Outfit Showing Tube Plate, Bead Molds, Spacers, Clamps and Tools.



Some Shops Use Sectional Molds Which Are Equipped With Inside Arms and Boiler.

Locating Trouble in Electrical System

Repairs on Electrical System of Automobile Require Special Equipment
Just as Do Mechanical Repairs—Some of the Instruments Commonly Used
in Well-Equipped Electrical Service Stations Described and Illustrated

By J. R. Bayston
President, Chicago Automotive Institute

At the present time, all automobiles are equipped with an electrical system as standard equipment. These systems naturally require attention from time to time when it is necessary to make repairs and adjustments. This attention requires special equipment, just the same as special tools and equipment are needed when making mechanical repairs.

Today the well-equipped electrical service station—one that is equipped to handle troubles on the complete electrical unit—is generally provided with testing apparatus, such as voltmeters, ammeters and hydrometer. This article will discuss chiefly the use of such instruments in connection with locating troubles.

The best instrument suited for all-around test purposes is a combination voltmeter and ammeter. It should have a voltmeter scale, ranging from 0 to 3 volts, 0 to 30 volts and 0 to 0.1 volt, to measure various voltages in different circuits. There should also be three shunts, having a capacity of 0 to 3 amperes, 0 to 30 amperes and 0 to 300 amperes, which are used in connection with a 0.1 scale to take current measurements. Equipment of this sort is shown in Fig. 1.

Sets can be purchased for the garage having this combination, together with a set of calibrated leads, which will give the exact reading when connected into a circuit. When the instrument is used as a volt-

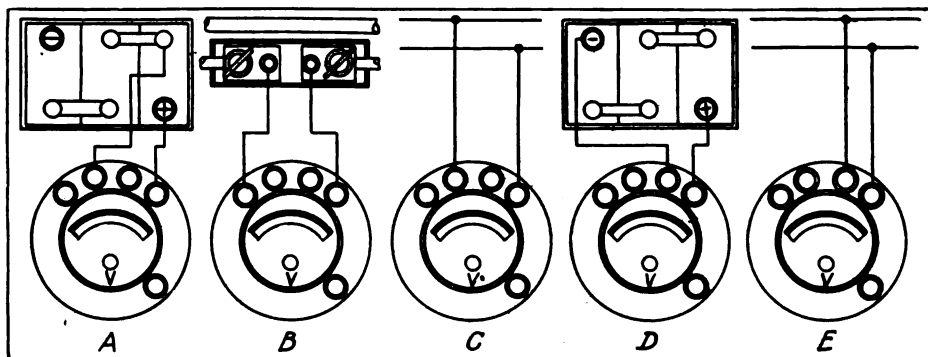


Fig. 2. Shows Method of Making Connections for Various Tests.

meter, it is necessary to select the proper scale for the circuit, and if there is any doubt as to the strength of the circuit, start at 30 volts. If the deflection on the scale indicates less than 3 volts, the 3-volt scale can be safely used.

The 0.1-volt scale is used only in connection with the shunts and also for special armature testing. When the voltage of a storage battery is to be measured, also the voltage of generators, the 30-volt scale should be used, the proper method of connecting it being illustrated in diagrams shown in this article. In connecting the voltmeter, great care should be taken to see that the terminals are properly connected across the circuit. It is necessary to connect the positive terminals of the

ammeter to the positive side of the circuit, and the other terminals to the negative side.

If the polarity of the circuit is not known a trial reading can be taken. If, during this trial reading, the pointer moves to the right, the meter is properly connected. If, on the other hand, it moves to the left, it will be necessary to reverse the connections to the ammeter. This should be done where the wire connects to the circuit and not at the ammeter, as there is greater liability of causing a short circuit if it is done at the ammeter.

On some systems the polarity of the generator and the entire system is governed by the storage battery. The main use of the 3-volt scale is to test the terminal voltage of the different cells of the storage battery and it should be connected as in Fig. 2-A.

It is also used when testing for short-circuited fields in the motor-generator. When used as an ammeter, it is necessary to first select the proper shunts and, if the value of the current to be measured is not known, it is well to start with the 300-ampere shunt and then come to the 30-ampere shunt if the reading on the 300-ampere shunt shows current of a value less than 30 amperes. These shunts are connected in the manner shown in Fig. 2-B.

All shunts are connected in the circuit in a similar manner, so that it simply requires a substitution of the different shunts to secure different readings. Connections are always the same. If the polarity happens to be wrong, it is only necessary to reverse connections from the ammeter to the shunt, which should be done at the shunts.

It is unnecessary to reverse connections to the shunt itself. As a rule a 300-ampere shunt will be used for measuring starting circuits. A 30-ampere shunt is used for

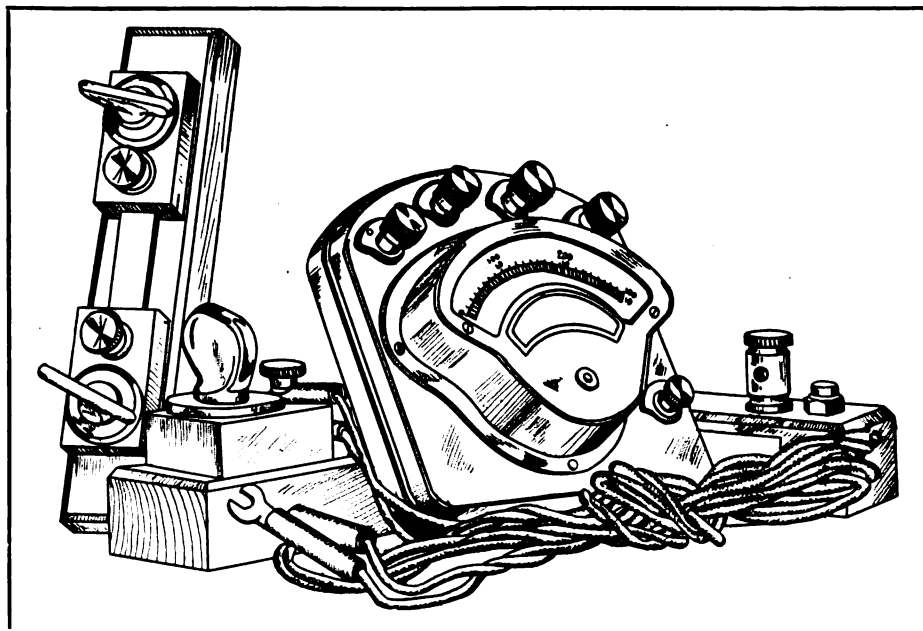


Fig. 1. Test Equipment Which is Suitable for All-Around Test Purposes.

measuring charging current, and a 3-ampere shunt for shunt fields in generators and circuits feeding individual lights; also when making an adjustment of the ignition relay.

The accurate testing of armatures for various defects that may develop involves the use of test points and the voltmeter. The particular application to armature testing will be explained in detail later on in this article. It is, however, unnecessary to remove some generators in order to make a test of the armature although it is advisable to do so, as other defects can be easily noted.

In case there is easy access to the commutator, the brushes should be lifted and insulated from the commutator by means of cardboard or heavy paper before the circuit testing is started. In case a coil in the generator armature is grounded, it will cause the output to be cut down in the two-unit type and, in the case of the Delco single unit, the cranking speed will be materially reduced.

To test for a grounded coil, make connections as shown in Fig. 3-B. One of the test points should be placed on the frame or shaft of the armature—all armatures, you must remember, are grounded—and the other point on the generator commutator. If the lamp lights, it will indicate a ground on the commutator. A grounded starter will cause an excessive current to be drawn from the storage battery while the engine is being cranked, or it will prevent cranking entirely.

This is tested by a similar method to that used in the preceding paragraph, except that the test point is placed on the motor commutator instead of the generator commutator.

Short-circuits between the motor and generator armature coils, in most cases, will decrease the speed of cranking and also cause the armature to continue to run after the engine has been shut down. This defect is tested by placing one of the test points in the generator commutator and the other on the motor commutator. If the lamp lights, it will indicate a short-circuit between the motor and generator windings. See Fig. 3-A.

When testing for open or short-circuited generator armature coils, the generator brushes should be left in contact with the commutator, but the storage battery should be disconnected from the system. Then disconnect the shunt field from the brushes and connect up a dry cell and an ammeter having about a 30-ampere scale to the brushes as shown at Fig. 3-C. Then turn the armature over slowly by hand. If the commutator is in good shape, and the brushes are making good contact, a very noticeable change in the ammeter reading will indicate an open or short-circuited armature coil. To see whether the coil is open-circuited or short-circuited, the following tests should be made:

OPEN-CIRCUITED COIL: Connect the

brushes to the terminal of a dry cell so that current of about 10 amperes is flowing through the brushes. The field should be entirely disconnected. Then, with a special pair of points connected to the three-volt scale of the voltmeter, measure the voltage across each two adjacent commutator bars. If there is an open-circuited coil, the voltage reading will increase materially, Fig. 3-D.

If there are no open-circuited coils and the preceding tests show that there is some armature trouble, the armature should next be tested for short-circuited coils. This should only be done after the preceding tests have been made, as an open-circuited coil might cause the 0.1 volt scale of the voltmeter to be burned out if this test were made first. The armature is connected as described in the case of open-circuited coils, but for this test the 1-10-volt scale is used instead of the three-volt, Fig. 3-E.

The voltage drop between each two adjacent commutator bars is then measured by slowly turning the commutator by hand. The readings should all be approximately the same. If any of them drop nearly to zero, it will indicate that one or more of the armature coils are short-circuited. In taking these readings, care should be used to keep the points on adjacent bars, otherwise the voltage drop may be sufficient to injure the voltmeter.

If any of these tests show trouble, it will be advisable to install a new armature, or to send the armature to the factory to be repaired. Unless the fault is visible to the eye, it is inadvisable to attempt to have such armatures repaired except at the factories manufacturing them, where special equipment for this class of work is available.

The armature in the Delco motor-generator differs from the usual form of construction in that it is double-wound, having two separate windings and commutators—one winding for the motor, and the other for the generator. The brushes are so arranged on the two commutators that when the starting pedal is pushed down and the motor-generator is being used to crank the engine, both of the motor

brushes make contact with the motor commutator while, at the same time, one of the generator brushes is lifted off.

However, when the starting pedal is released, one of the starting brushes is automatically raised and the lifted generator brush dropped to make contact with its commutator, thus permitting the machine to operate as a generator. The generator output is regulated by the third-brush principle.

The system has no cutout, as it is usually found, the closing and opening of the charging circuit being taken care of by the turning on and off of the ignition button.

Troubles in the electrical system of an automobile are generally those which prevent the current from traveling in its proper path and doing the work that is expected of it. Almost all electrical troubles can be placed under one of four heads: Open circuit; circuit having abnormally high resistance; short circuit; and the modification of the short circuit, called a "ground."

An open circuit occurs when a wire becomes detached from one of its terminals or breaks, or when a connection is dirty or improperly made so that the current-carrying surfaces do not make proper contact with each other—thereby preventing the current from flowing because of the lack of a complete path or circuit.

High resistance may result from poorly made or dirty connections, wires that are partially broken through, wires that are too small for the work they must do, or dirty, pitted and corroded contacts in the dynamo, cut-out or regulating parts. A high resistance in a circuit will be indicated by a low generator output and a high generator voltage.

A loose connection will cause a variable output—low when poor contact is made and high when good contact is made at the connection. A high-resistance connection frequently occurs at the battery when battery terminals become corroded. Frequent cleaning of the storage battery terminals is recommended and coating with vaseline to prevent corrosion is also a good precaution.

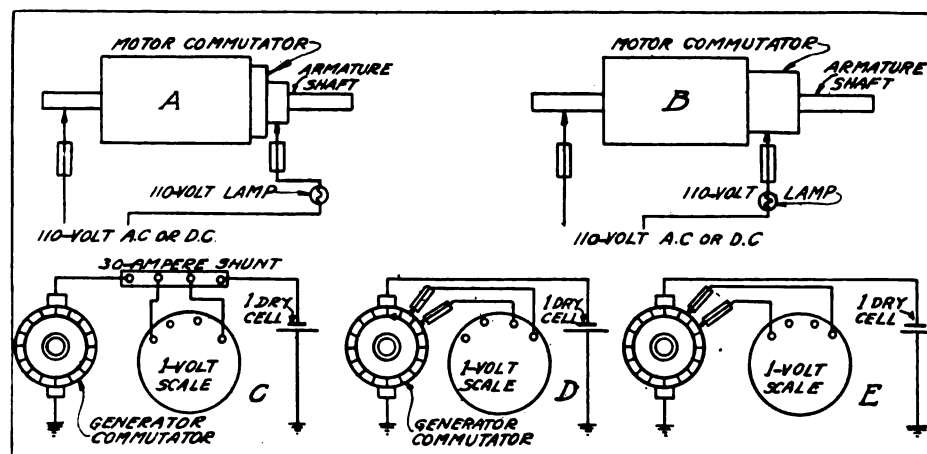


Fig. 3. Testing for Grounded Coil and Short Circuits.

A short circuit is established whenever an accidental ground occurs in a circuit at a point that allows a flow of current where there should be no flow, or that permits the current from the generator or battery to return without passing through the lamps or other devices that are designed for using current. This may be caused by two wires being crossed and making electrical contact, or by the insulation being worn off so that an electrical contact is made with the metal of the car. The metal then completes the short-circuited path for the current.

The success of any electrical installation depends upon the flow of current being kept within the conductors designed to carry it and, should the insulation fail or exposed parts come into contact so that a flow of current is allowed where it should not be, the result will be a drain on the battery, failure of generator, failure of starting motor or of almost any of the electrical units, depending upon the point at which the short circuit occurs.

A ground is a form of short circuit established through the metal parts of the car. On a grounded (one-wire) system—that is, a wiring system using the metal parts of the car to carry the return current—a ground occurs when a current-carrying conductor comes in contact with a metal part of the car.

It can readily be seen that, if the ground occurs between the battery and any part of the equipment, the result will be a short circuit, the current returning to the battery through the metal of the car instead of first going through the current-using devices and then returning to the battery. On an insulated (two-wire) system, it is necessary that both wires make contact with the metal of the car before a short circuit can result.

The test lamp is a very convenient means of indicating, by means of a flow of current, whether a circuit is complete through a certain path or not. If one side of an ordinary drop cord, as used for shop and garage lighting, is opened, the lamp can be used as a test lamp. Cutting one wire will open the circuit and prevent the lamp from lighting as long as the two ends are separated, but when the ends are brought together the circuit will be complete, as will be indicated by the lamp lighting.

The lamp may be used as a test by touching the two free ends to any points between which it is desired to make a test. If the conduction path is not complete, the lamp will not light, indicating an open circuit, Fig. 3-B.

A low-voltage test lamp is a very convenient article for locating trouble, and is made in the same manner as the set just explained, except that a small socket is used which will take a six-volt automobile lamp. An ordinary automobile trouble lamp makes a good test lamp. This low-voltage lamp can be used for many tests where a high voltage lamp cannot be used.

The leads from this lamp can be connected to the terminals of the generator to see if it is generating or the lamp can be connected across a battery, an ignition-coil primary, switch terminal or any place where it is desired to ascertain whether a voltage exists or not.

The approximate voltage can be determined with the test lamp. For instance, if a six-volt lamp is placed across the terminals of a six-volt generator or battery and the lamp burns with full brilliancy, the battery or generator must be producing in the neighborhood of six volts. If the lamp burns only half bright, the voltage must be low or in the neighborhood of three volts. The low test lamp can be used to test for grounds, short circuit, open circuits, etc., by connecting a storage battery or dry cells in series with it, Fig. 2-E.

TESTING GENERATORS: To test the field, connect battery across the field with an armature in series. A field drawing excessive current indicates a short-circuited field winding, field connected wrong or, in single-wire systems, field grounded to frame of car. An open field will be indicated by the ammeter indicating zero.

TESTING THE ARMATURE: When the generator is operating and the armature is drawing an excessive and fluctuating current, it indicates a short-circuited armature or, on single-wire systems, a grounded armature will be indicated by a very pronounced sparking at brushes, and the commutator bars which are connected to the open coil or coils will be badly pitted and burned.

The generator refusing to motor in the Delco single-unit system may indicate a wrongly connected field, open circuit at two or more places on opposite sides of armature, a very dirty or badly burned commutator, brushes sticking in holders, or open circuit in the field winding, field leads or armature leads.

MAKING PROPER CONNECTIONS FOR MOTORING GENERATOR AND TESTING FIELD GROUNDED SYSTEMS: With one terminal of battery grounded and generator frame grounded, connect the other battery terminal to generator terminal on the relay regulator next to the fuse or the fuse terminals. See that it is intact and that the regular points make good contact. The generator should motor with these connections made.

When testing the field winding, using the connections mentioned, raise the insulated brush on the generator and the field will be connected across the battery direct.

On insulated, two-wire systems, connect one battery terminal to the brush which connects directly to the field, and the second battery terminal to one of the stationary points of the regulator, or the leads connecting the regulator—making sure that the regulator points are making good contact. The generator should then run as a motor.

When testing the field winding on this

system, use the above connections, raise the field brush—that is, the brush to which the battery lead is connected—clear of the commutator, and the field will be directly across the battery.

THIRD BRUSH GROUNDED SYSTEM: In the case of a generator on which third-brush regulation is used, ground one side of the battery and the generator frame. Then, if the ungrounded lead of the battery is applied to the insulated terminal on the generator frame, the generator should run as a motor.

In testing the field winding, connect one battery lead to the insulated terminal on the generator, and the second to the third brush with the third brush raised from the commutator. The battery will then be connected across the field.

THIRD BRUSH INSULATED SYSTEM (TWO-WIRE): For insulated systems, third-brush, two-pole generators, connect the battery across the generator terminals and the generator should motor on pressing down the relay armature.

When testing the field winding, use the above connections, raising the main brush—which is farthest from the third brush—from the commutator and the field will be connected across the battery.

ARMATURE TEST GENERATOR RUNNING AS A GENERATOR: A high cut-in—that is, the relay cutting in at too high speed—may indicate that the relay is out of adjustment, a reversed or wrongly connected field, the armature short-circuited, a dirty or burned commutator, bad brushes or brushes sticking in holders or, on a grounded system, a grounded armature.

Low generator output, with normal or low voltage, may indicate that the regulator is out of adjustment—that is, that the spring holding the contacts in closed position may need adjusting to hold them closed longer, dirty or burned regulatory contacts, armature short-circuited, badly discharged battery, field coils connected wrong or partly shorted out or, on third-brush regulation, the third brush may need adjusting.

Low output, with high voltage, indicates loose connections in battery circuit or battery circuit open. High generator output may be caused by only one regulator point making contact, thereby cutting only half of the regulating resistance into the field circuit, or the regulator contacts may need adjusting so that the spring does not hold them closed too long, or may be sticking closed. If third-brush regulation is used, the third brush may need adjusting.

The failure of the generator to charge the battery may be caused by dirty or badly burned relay contacts, an open circuit in wiring or connections, fuse out, battery greatly over-discharged or badly sulphated.

The failure of the generator to function may indicate an open field, a field with two adjacent poles reversed, an open circuit in wiring or connections, or armature open at opposite sides.

(To be continued.)

Lead Burning and the Storage Battery

This Third Article of the Series on Storage Battery Work Discusses the Process of Lead Burning—Good Lead Burning Requires Much Practice and a Great Amount of Care—Two General Methods Are Defined and Explained

By S. E. Gibbs, M. E.

Superintendent of Shops, Des Moines University

Lead burning is one of the most difficult and also one of the most important jobs to be done around the average service station. Probably no other one cause is responsible for as many "come backs" and dissatisfied customers as poor lead burning.

The term "lead burning" is rather misleading, as the operation it is commonly applied to is, in reality, "lead welding." The latter term is gaining somewhat in popularity recently, yet the average battery man refers to the process of fusing various lead battery parts together as "lead burning."

The general methods of lead burning—namely, electric and gas torch methods—are in common use in practically every battery service station. The electric method is used chiefly in emergencies and, as used in the average station, is responsible for rather rough work, besides being slow and rather expensive.

The current is usually taken from a storage battery and the burning device consists of a carbon stick about 4 inches long and $\frac{1}{8}$ th of an inch in diameter, together with a suitable handle for holding the stock and two heavy cables. The carbon stick is clamped into the handle near one end, and then the short end is sharpened. The cable from the handle is next fastened to the positive post of the battery and the negative post fastened to the lead to be burned by means of the other cable.

The operation is started by touching the point of the carbon to the lead. The carbon will become red-hot at once and the lead near it will be melted. By moving the point around, a larger puddle of molten lead can be formed. A stick of lead—which is usually cast about 12 inches long and about $\frac{1}{2}$ inch across on each side—can be held against the carbon just above the point and thus melted and run into the puddle.

As it is the high resistance to flow of the electric current that heats the carbon, the handle should be kept as close to the point as possible so that only the useful portion is heated.

It is almost impossible to get a good finish on a job by this method, but a good solid weld can be made and a little dressing will improve the looks of the job. Every battery station should keep an electric outfit at hand for emergencies, and if one is carried in the service car it will prove handy in case of a loose terminal or connector as it can be operated from the battery in the service car. Thus the repair can be made quickly and the customer started on his way with the least possible delay.

The gas torch is in almost universal use at the bench, and provides a fast and cheap method of burning. Various types of torches are in common use and several kinds and combinations of gases are used. Almost any of the standard makes of torches will give good results, but each manufacturer has certain features especially developed in his product so that the battery man may select the one which meets with his conditions and appeals to him.

A combination of city gas and oxygen is probably the most common fuel where the city gas is obtainable. This gas is cheap and always ready for service, but a certain

amount of difficulty is sometimes encountered unless the pressure is rather high and comparatively even. Some workmen complain that the city gas produces a rather dirty flame, but it is used satisfactorily in many instances.

Oxygen and acetylene is a combination that is in very common use and does nice work. As large

quantities of this gas are used in almost every community for welding, it is comparatively easy to obtain.

Oxygen and hydrogen are claimed by many to be the most ideal combination, as hydrogen, when properly used, has a tendency to clean lead. Hydrogen is not easily obtained in certain localities and is somewhat dangerous unless handled properly and carefully. Some battery stations use a hydrogen generator and are thus assured of a constant supply.

Compressed air—and various gases, such as hydrogen and city, or natural gas—is used in some instances but more or less trouble is often encountered in maintaining the air pressure. Unless it is used for other purposes, the cost of the compressor and mechanism would be a big factor.

Much of the operator's success in lead burning depends upon his ability to adjust the flame and apply it so as to get the maximum heat applied where it is needed. The flame, *A*, shown in Fig. 1, represents the gas, such as acetylene, hydrogen or city gas, just after it has been turned on and lighted and roughly adjusted.

The usual method of lighting is to allow a little gas to escape for an instant before it is exposed to a flame, and then it is adjusted so that the flame leaves the tip about $\frac{1}{16}$ th inch. Then the oxygen should be turned on slowly and the effect on the flame carefully noted.

Fig. 1-*B* represents an oxygen-acetylene flame in which an insufficient amount of oxygen has been turned on. In this flame

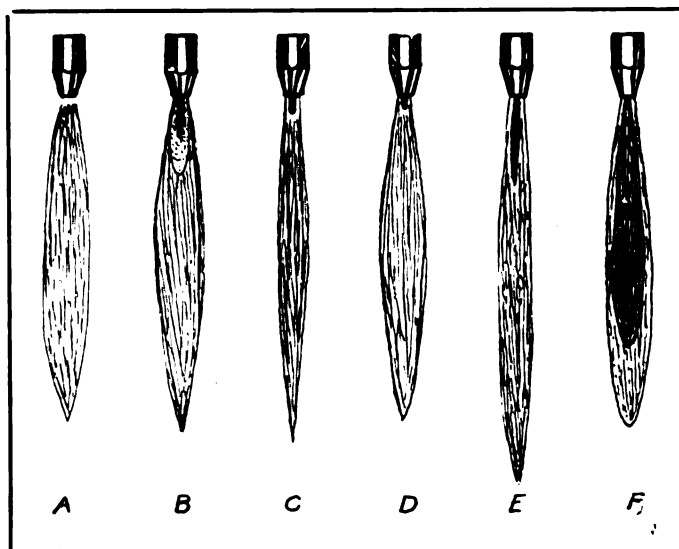


Fig. 1. Illustrating the Various Flame Types.

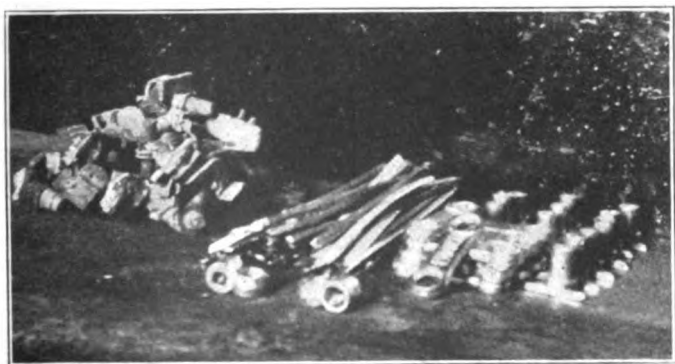


Fig. 2. Old Lead Parts Turned Into New If Mold Is at Hand.

the center is white and shaped somewhat like a rose bud, and would be designated as a carbonizing flame. Fig. 1-C represents the correct or neutral flame. The cone has become blunt, with no ragged edges, and of a bluewhite color. Fig. 1-D is an oxidizing flame which will prove very injurious to a lead weld and should be carefully avoided. A slightly carbonizing flame is not really dangerous and if there is any doubt one should stay on the safe side.

Fig. 1-E is an oxygen-hydrogen flame in proper adjustment. A narrow blue streak shows in the center of the hydrogen mantle when the adjustment is correct. Fig. 1-F is a similar flame, with a slight excess of oxygen, and should be avoided as it would oxidize the molten lead and make burning difficult.

The best part of the hydrogen flame is usually about $1\frac{1}{4}$ inches from the tip, and a little experience will enable the operator to quickly locate the proper distance to keep the torch from the work. The torch is held somewhat nearer to the work when oxygen and acetylene are used, as can be seen from the character of the flame.

The size of the tips depends largely upon the skill and speed of the operator and the type of work to be done. A large tip is fast but requires a good operator, while a poor operator can do a fair job with a small tip but much more time will be required. Large pieces are not as difficult to handle with a large tip, so the size varies somewhat in proportion to the size of the pieces to be burned.

Battery work with the torch is much more difficult than it seems to a bystander. Good lead burning requires much practice and a great amount of care. It seems that some people can never learn to do first-

class work, while others pick up the work with comparative ease.

Dirt and lead will not mix, as the dirt is light and floats on top. The lead parts to be welded must be cleaned before a weld is made or, in most instances, the weld will be poor and probably will not hold. It is true that an expert can weld more or

the operator should work fast in order to complete the job before the adjoining metal is heated to the point where it will crumble or melt. In most instances, only a small portion of the weld should be made at one time and the parts should be allowed to cool between each operation.

Lead burning jobs, such as are commonly done in the average battery service station, can be divided into two broad classes. They are post building—which includes the burning on of terminals and connectors—and the assembling of plates and straps. Old connectors and terminals are rather difficult to clean and burn, so, in many instances, modern stations keep a good supply of lead parts and use a new part rather than to attempt to put an old one back into service.

This method enables a workman to maintain high speed and the percentage of defective jobs is much less. In many instances, the new parts are actually cheaper. They also make a neat

job, which has its effect upon the customer. The old parts can be sold as scrap lead or, if a few molds are at hand, the parts can be allowed to accumulate for a short time and then can be molded into new parts at very little expense, Fig. 2. However, there are many instances in which new parts are not to be had so the old parts must be used.

When removing connectors or terminals that are not to be used again, the workman usually makes a quick job of it by cutting the post below them with a pair of pinchers. When they are to be used again, a hole is drilled through the connector or terminal directly over the post.

If the bit is not properly centered, a thin section will be formed on one side and will "run over" easily when being burned into place again. Terminals should be set high enough that a wrench will have rea-

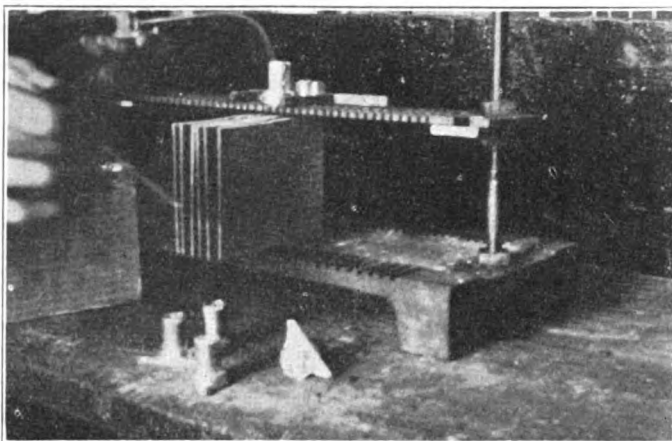


Fig. 2. The Lead Burning Rack.

less dirty lead but the chances of failure are too great and, in all instances, cleanliness is well worth its cost.

Another difficulty which requires skill and judgment to overcome is the tendency for the lead to "run over." Lead melts at a low temperature or, in other words, at about 650 degrees Fahrenheit, and is a fair conductor of heat. If the flame is not directed squarely at the portion to be welded and removed at just the proper time, the whole mass will melt and flow about promiscuously.

Lead becomes rather grainy and soft at a somewhat lower temperature than that at which it melts, so the part to be welded should be held firmly and so that no strain will be exerted at the weld or a break will usually spoil the job. The torch should be adjusted to deliver an intense heat and



Fig. 4. Clean Lugs With File Before Placing in Burning Rack.

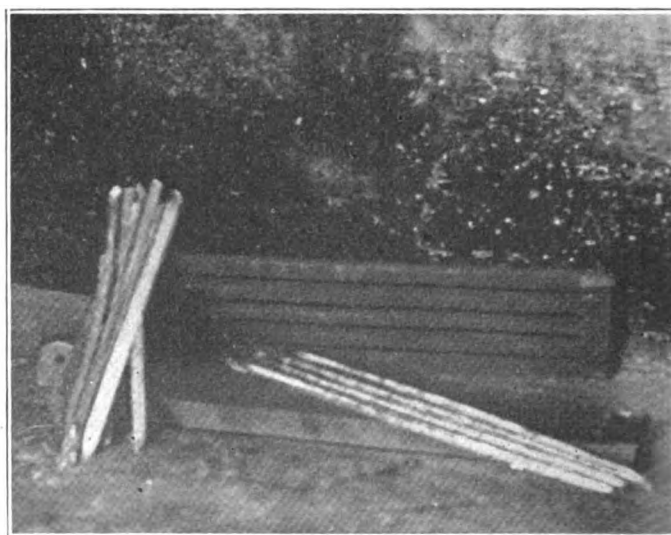


Fig. 5. Lead Burning Strips and Mold They Are Cast In.

sonable clearance when tightening terminal screws. Connectors and terminals should be well supported and held firmly, as a slight strain will cause the hot metal to be broken—lead being very brittle just before it melts.

When the parts are in place and clean, the flame should be applied to the center of the post and a round puddle of molten lead formed. Before this puddle has become large enough to reach the sides of the post, the flame should be directed against the inside wall of the part being welded into plate and the wall melted just as the flame has caused the puddle to be extended to the edge of the post at this particular point.

A little experience will teach the operator just how big the puddle should be and at what speed the torch should be moved around the edge in order to get a good job and yet not overheat the walls and cause them to melt through. When this has been accomplished, the torch should be removed and the next weld can be started while the first one is cooling.

When the flame is again applied, it should be directed toward the center of the post until a puddle of molten lead is formed. Then lead may be added from a burning stick but each drop should disappear into the molten mass. As the puddle widens and its edges come near to the edges of the post, the flame should be passed around the outside and the weld extended to the inner walls again. Probably by this time—especially if the operator is not exceptionally fast—the work should be resumed at another joint.

When enough lead has been added to bring the post up to the top of the piece which has been added, a little more lead should be added and the flame passed around in a small circle near the center of the post. If the edges do not finish up nicely, a quick pass of the flame in a little wider circle will often produce a nice finish.

If the lead has become somewhat dirty, the joint may be cooled and brushed with a stiff wire brush but one should make sure the lead is cool and solid or the job may be ruined. Then the finishing touches may be put on, in much the same manner as that just performed.

When no terminals are used, it is often necessary to build up posts. This is usually accomplished by placing a mold over the stub and adding lead in much the same manner as when putting on a connector or terminal. However, after the building has once been started, there is little danger of running over, but the mold absorbs much of the heat from the lead so it is rather difficult to get a properly welded surface and the flame must be played around the mold much of the time. It is a good plan to smoke the mold so that it will not absorb the heat rapidly and also it can be removed

a little easier. All such joints should be tested carefully, as a poor weld will cause all sorts of trouble.

Plates are usually held in a plate-burning rack, Figs. 3 and 7, while being welded to the straps. Small square iron blocks are often placed around the group, to prevent the lead from running sideways, but special forms can be made from any quarter-inch

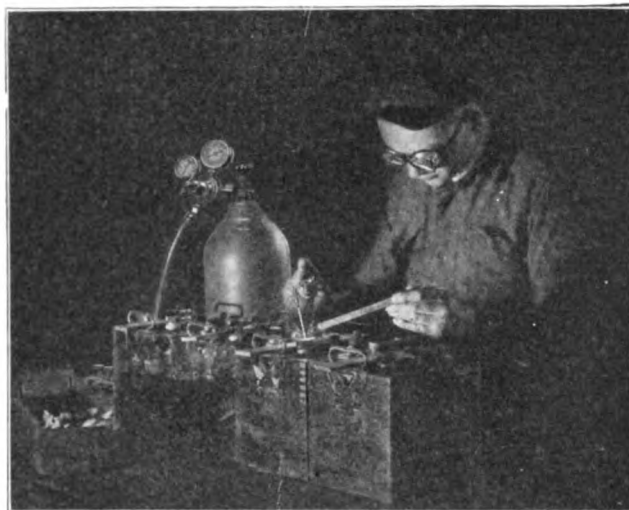


Fig. 6. Showing One of the Popular Types of Lead Burning Torches in Operation.

square stock that will serve much better as it insures the operator that he will get the exact size quickly and he never has to file off part of the metal before a group can be put into a jar.

The top of the lugs should be cleaned, Fig. 4, before being placed into the rack, and they should be trimmed so that they will not project more than $\frac{1}{8}$ -inch above the rack, if a good weld is wanted with a mini-

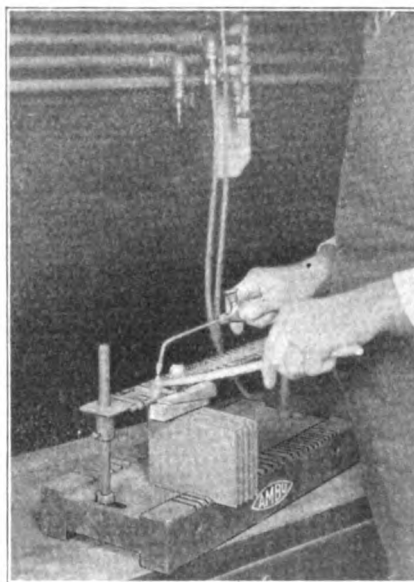


Fig. 7. Plate Burning Rack in Use.

mum of effort and skill. The flame should first be applied to the lugs at the outside and passed back and forth, gradually approaching the strap. The lugs should be melted

down and, if possible, into a solid mass during the first time over.

Too much heat should not be applied or the lugs may be melted below the rack and the lead will run through, thus making it necessary to put new lugs on the plates before the operation can be finished. Lead can be added from a burning stick until the level is up to that of the strap. All plate-burning jobs should be inspected carefully, as a loose one might cause a spark which would probably ignite the gas in the cell and cause the battery to explode.

New lugs can be burned to plates which have been sawed from an old strap or on which the lugs have been damaged. By laying the plate on some metal surface and fitting a form—the shape of the lug to be built about it—lead can be run into place and a fair job accomplished. The greatest difficulty is in getting the proper thickness, and often the lug must be filed somewhat before it will fit into the slots in the burning rack.

Another method consists of burning a piece of another lug onto the plate. This method is fast and, as the weld is below the rack, it will not interfere even though it may not be exactly the right thickness.

Before starting any work with the torch on the top of the battery, all vent caps should be removed and the flame passed over the openings. This will allow any gases to burn which may be in the cells and prevent an explosion which would be caused if the gases ignited through the tiny hole in the vent cap. The large openings allow the pressure caused by the burning to be released without damage, but sometimes a rather large flash is produced, and in extreme cases some acid is blown out, so the operator should stand back from the job while flashing the battery.

Too much importance cannot be placed upon the quality of welded lead joints. Recently a poorly welded post pulled loose when a driver was trying to start the car about midnight and all the lights were burned out, as the generator "ran wild" without the battery in the circuit. The owner bought new bulbs, paid a big bill for a man to fix up the job, and was obliged to let the car stand on the road over an hour on a frosty night. One can imagine his state of mind when he found that his trouble was all due to a poor job of lead burning on the battery he had placed in the car early in the evening.

Motor Car Registration in Province of Quebec.

Of the 57,503 motor car licenses issued in the Province of Quebec since April 1, 1922, 20,085 are in the city of Montreal while there are only 2,745 registered in the city of Quebec.

"Oldtimer's" Letters to a "Beginner"

"Oldtimer" Tells How He Selects His Employees—"Watch the Young Men in Your Locality Who Are Interested in the Car's Mechanism," He Suggests "Among Them You May Find the Material for a First-Class Working Force"

By B. I. Campbell

Dear Bob:

Reckon you must be trying to kid the old man some, aren't you? Hardly seems reasonable you should have been helped so much as all that by the little bit of advice I gave you.

But you need never hesitate about asking me questions, Bob, for nothing pleases us old fellows more than to have an up-and-coming young chap like yourself ask us about how *we* would do a job. Seems like most of the young men sort of look at our ideas as out-of-date, old foggyish and all that.

Maybe they are sometimes, but not if we've made it our business to keep abreast of the times. That's what I've tried to do, Bob, and that's what you must do. You can't stand still and have a growing business. You've got to keep yourself informed on how others are doing the work you want to do—about the new shop equipment and methods. That's where your trade paper is a real friend to you.

Now about that boy wonder, Tom Williams, that you're trying to make a salesman out of when the boy has his heart set upon becoming a master mechanic. Why do you do it? I remember that lad—last time I saw him he was a little tow-headed shaver about knee-high.

And I never think of the boy but that I

recall how old man Williams used to go on about the way Tom would tear up his toys as fast as he got them just to see what there was in them that made 'em go, and then how he would go to work putting 'em back together again.

Last time, I remember, it was his bicycle,



Even Your Cashier May Make Sales for You.

and his dad couldn't help showing, in spite of his aggravation over the kid's destructiveness, how proud he was that the boy could do such a good job of putting the machine together again.

Now, you say young Tom can't keep out of the shop and is forever tinkering out there when he ought to be behind the counter. Well, why not put him in the shop where he wants to be? You can use him there. From what you've told me, I'd say you really need him there. It never pays, Bob, to try to make a salesman out of a born mechanic.

Just the other day I was talking to a man who told me about a case of this kind. The chap he told me about was a A No. 1 mechanic, and knew how to turn out the most workmanlike sort of a job.

Then he went into business for himself. But instead of making his practical knowledge of shop work profitable to him through a service department such as he was so well fitted to conduct, he specialized on car selling.

Because he had built up for himself an exceptionally good reputation as a mechanic, people came to him at first for servicing work on their cars, feeling that they could depend upon him to give them reliable repairwork. But he insisted upon giving most of his attention to selling and neglected the service end.

As a result, he failed to do the paying business that he might have done had he

realized the profits a first-class service department could bring him. You've heard the saying "Shoemaker, stick to your last." Well, he didn't.

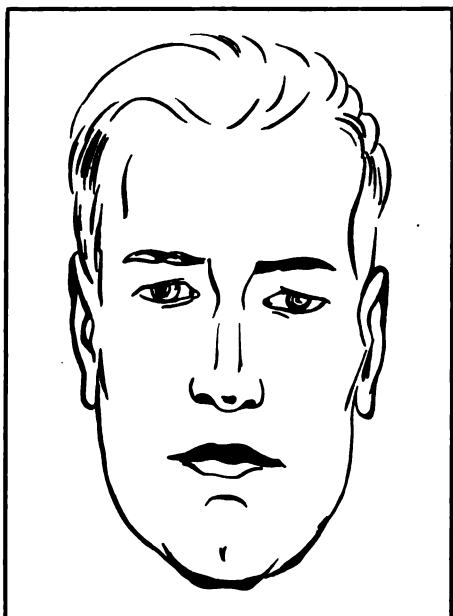
"Well begun is half done" applies to the establishing of a paying garage business as well as to anything else—and time and thought spent in obtaining a first-class working force is to be considered as an investment.

If I were you, I would put Tom in the shop under the training of your best workman, and some day you'll have a master mechanic there that you'll be proud of.

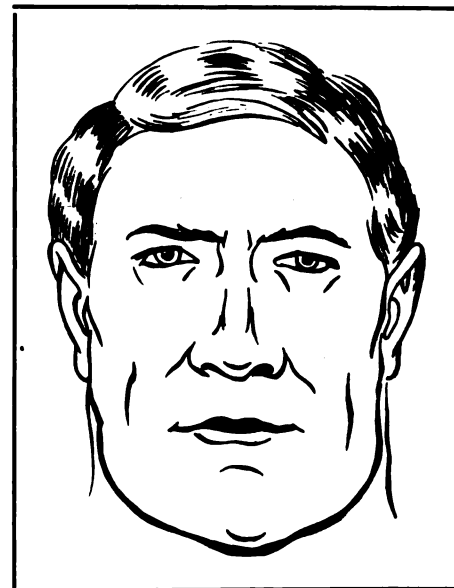
Then look about for a chap who's just built for the selling job you've got to offer him. What's Frank Velden doing now? He's what I'd call a real salesman type. Friendly, a good talker, meets people well and always makes a good impression—he's just the sort of man you want to get to do your selling for you.

That's the idea you see—keep your eyes open for the sort of man that fits the particular job you have to offer. Notice the young men in your town or in the country districts around that are interested in the mechanism of a car. You'll find any amount of raw material from which you can build up a working force that will give you the results you want.

It is always a first-rate plan to have a few



Persistent But Not Aggressive, Persevering and Diplomatic—A Good Clerk.



This is the Mechanic Type—the Man of Bone and Muscle.

expert workmen who can handle the hardest jobs, and then let your new mechanics work with the trained men. Don't forget, though, to give the new mechanic a chance to show what he can do alone, when he's ready for it.

Of course, when I say don't try to make salesmen out of your men in the shop, I don't mean to tell you that they shouldn't do any selling at all. On the contrary, your shop men can make some mighty good sales for you. Get them interested in your business to the extent that when they're servicing a car, they'll keep their eyes open for the equipment that car needs, and encourage them to suggest to the car owner his need of this equipment. You'll soon find they're bringing a good many dollars into your coffers.

About a year ago I was casting about for ways and means to increase my sales of accessories and car equipment. One morning I had a call from a business booster from the Automotive Equipment Association. Said he dropped in "to see if I might be interested in methods for increasing my shop profits."

Was I interested? I'll say I was, but it happened that he struck me at the wrong time. I had just had a call to come out to the shop, and was on my way out to find out what was wanted when this chap stopped me. I was in a hurry and was about to tell him he'd have to come back another time when some words I heard in the shop—we were standing in the doorway—made me stop and listen.

The conversation ran something like this:

Customer, who had just entered the shop, to the mechanic who was hurrying past him on his way to a job: "Say, friend, I'm in the dickens of a hurry. Couldn't you take a minute to get me a 'spare' and let me get out of here?"

"Have to wait your turn, Mister," answered Jack shortly, hardly turning to look at the man. "I've got a rush job here and I can't be bothered now."

The man gave Jack one look and was leaving the shop when I managed to get to him and smooth him down enough to sell him the spare—and one or two other articles as well.

My friend, the salesman, was waiting for me when I got back.

"Agreeable sort of a chap, that mechanic of yours," he remarked smilingly.

"Oh, Jack's all right," I answered. "He's a bit rushed this morning, that's all. Besides I've never expected my mechanics to take care of the selling end."

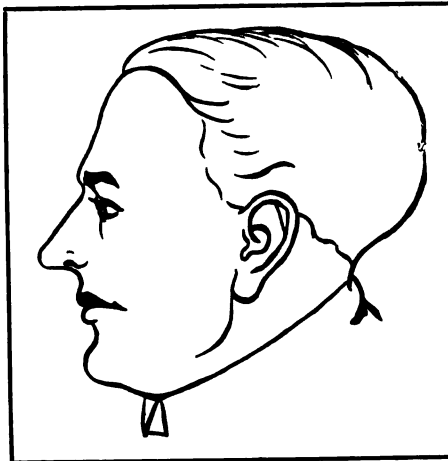
"Why not?" asked the salesman quietly. "Hasn't it occurred to you that you might be adding quite considerably to your sales totals if your mechanics could be interested in watching for the extras in the way of equipment which cars that come to your shop for service are needing?"

"Guess maybe you're right, in a way, but I'm not sure that my shop men would take kindly to the selling idea," I said.

"Ever try offering them a small commission on anything they might sell?" questioned the salesman.

"Why no," I replied. "I've always paid my men good wages, and I really never thought about offering them a commission."

"But," persisted the salesman, "can't you see that it would pay you to offer them a small percentage, say from two to five per cent on sales they might make when servic-



Friendly, Pleasant Type, With Keen Mind—
A Fine Salesman.

ing a car? Lots of these car owners who come to you for service need extra equipment that they won't think of asking for, but if you ask them to buy you'll often find that it means a sale."

Well, he finally convinced me that the plan was worth trying. And I'll tell you, Bob, that was one of the best ideas I ever adopted. Even Jack forgot to be surly when he knew there might be an extra dollar or two in it for him. I found it created a better spirit in the shop, too. It got to be a habit with the men to keep a lookout for extras customers might need. Pleased the customers, too. They seemed to feel that it showed we were really interested in serving them.

And, by the way, I had a little talk later with Jack about his manner toward customers. There's one rule I've insisted upon having observed always, and that is that every visitor to my place be given courteous attention, whether he buys or not. My men may be too busy to serve him at once when he comes to the shop, but they are never so busy that they can't try to find someone who can give him attention or, failing that, ask him in a courteous way to wait a while.

Do you know that some of the very best advertising you can get is gotten that way? You know how tramps going through some of the country districts used to mark the gate posts of places where they were given a good "feed" so that fellow "hobos" traveling the same way might profit thereby?

Well, it's a good deal the same with motorists. When they strike a garage that gives them good work and courteous attention, they tell every other motorist they

meet about it, and the good word travels on and on just like a chain letter system. And by the same token, the bad report is going to do the same thing if you give it the opportunity—only it always seemed to me it traveled a little faster and a little longer.

A manager of a downtown shop told me of this little incident the other day. A wealthy customer who hadn't been doing much business with them of late called him on the telephone and said:

"Mr. Blank, some time ago I declared I'd never go into your place again because of the sort of attention, or rather the lack of attention that I'd received. But today I went in there to make a small purchase and one of your salesladies (a new one they'd just taken on) gave me such exceptional service that I've decided to give you my business again if I can count upon having that particular sales person serve me when I come in."

Incidentally, this customer added that he intended coming in soon to make a purchase of considerable value. This sort of goodwill is just as important in the garage business as any other, and quite as easily cultivated.

So you can see how necessary it is that you select the man that is fitted for the work he is to do. For if he doesn't like the work he is doing, he is not going to be interested in it, and if he isn't interested in it, he can't give the sort of service that you must have to keep your business growing.

I am enclosing some sketches that I ran across not long ago. I have noted on each sketch the sort of work the type of man represented by the sketch is likely to be found most fitted for. These have worked out well for me and maybe they will help you. Some time, if you wish, I'll tell you more about this method of choosing your employees, also of sizing up customers and prospective customers.

By the way, Bob, don't forget to have a Christmas display window. Automotive equipment makes mighty nice Christmas gifts for the men who own cars. If I were you I would send out some letters and circulars to the wives and friends of some of these fellows whose cars you happen to know are lacking in certain items of equipment. It may mean some nice little sales for you.

Your old friend,

JOHN EVANS.

Netherlands a Profitable Market for Moderate-Priced Car.

U. S. Consul Mahin, Amsterdam, reports to the Department of Commerce that interest in both motor cars and motorcycles seems on the increase and it is thought that there is a profitable market for a moderate-priced car, though automobiles are not used in Holland as largely as in other countries, owing to the high tax on them and to the great popularity of bicycles.

Truing Lathe Centers and Turning

To Do Accurate Work on the Lathe It Is Necessary to Have the Line and Dead Centers Running True and of Proper Shape—This Article Tells How to Repair Worn Centers and Adjust Them for Straight and Tapered Work

By G. H. Radebaugh

Accuracy in cylindrical turning is obtained by having both correctly formed centers and the relative position of the two centers in proper alignment. Centers should run true and be of proper shape, because:

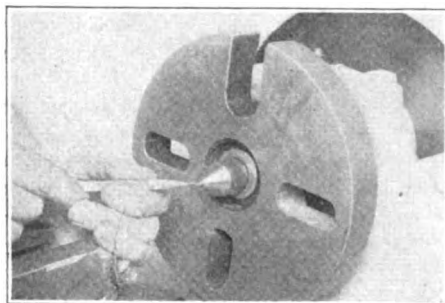


Fig. 1. Testing a Live Lathe Center With a Pencil.

- (a). Center will fit center holes in job;
- (b). Work can be turned end for end between centers and will run concentric with center holes;
- (c). It prevents turned work from running eccentric, when placed on true centers.

Lathe operators understand fully the importance of correct centers, as a job is either done right or wrong by the condition of the centers on which the job is turned.

Before placing a cylindrical turning job between the centers, the line center should be tested for trueness. This can be done with pencil, chalk, indicator, or tool. In Fig. 1 is shown the operator making such a test with a pencil. Wipe the center clean and have the drive belt on the second belt speed, with the center revolving. At this speed it is tested for concentricity, as shown.

Another method of testing is shown in Fig. 2. This is a more accurate test than the former method, for it gives a direct reading as to amounts the center is running out, in thousandths of an inch. If

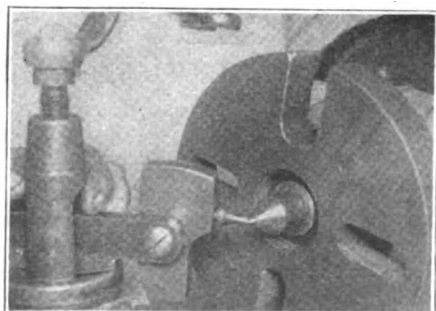


Fig. 2. Determining Exact Amount Center Is Running Out.

the center runs out, see if the center is placed in the socket as it should be, and determine if it is securely in place in the spindle of the lathe.

Many times a center has been put in place with a small particle of grit on the bearing surface, thus causing the center to run out. To overcome this difficulty remove the center and wipe out the socket hole and the center body and replace. If the center still runs out, about the only thing left to do is to turn or grind to trueness.

It may seem unnecessary to invite the trouble and time required to redress centers. It is, however, the only way to keep a lathe fit for accurate work. Lathe centers can be reshaped and centered accurately by:

- (a). Turning center, if soft, with a round-nose turning tool;
- (b). Turning by annealing centers;
- (c). Grinding hardened centers with electric grinder;
- (d). Grinding hardened centers with a

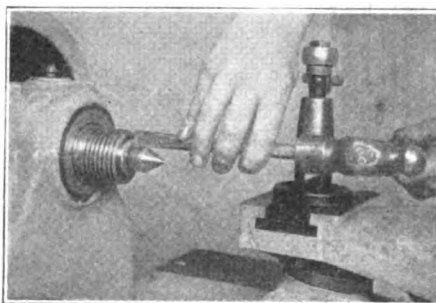


Fig. 5. Placing Witness Marks on Lathe Spindle Socket and Center.

small belt-drive grinder against cone pulley;

- (e) Grinding hardened centers with small belt-drive grinder from cone pulley.

When truing a center by turning, if the line center is hard it must be removed from the spindle of the lathe and annealed. Remember the lathe is provided with two centers. One is found in the spindle of the lathe and is known as the line center and one in the tail-stock, which is known as the tail-stock center.

Some lathe operators use centers that are soft, but it is recommended that both centers be hardened, as this causes the centers to stand up much better in service. It is often the best practice to have the tail-stock center hard, while the line center is kept soft for ease and convenience in redressing by turning. This is a more expensive practice than keeping both centers hard, as the soft center does not hold its

shape and trueness as it should and is soon completely worn out by repeated redressing operations.

When redressing centers, the tail-stock center should be redressed first, so it will

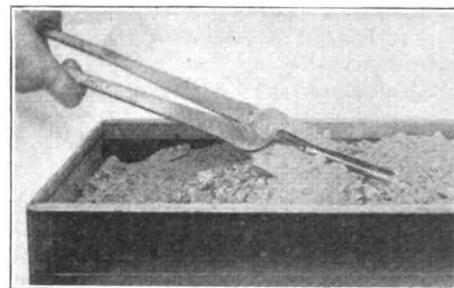


Fig. 3. Anneal Hardened Centers by Heating to Cherry Red in Thick Forge Fire.

be possible to leave the line center in place after it has been redressed.

How to Anneal Tool Steel.

Lathe centers are made from carbon steel and, if hardened, must be annealed before they can be turned with a turning tool. Carbon steel can be annealed by several accepted methods:

- (a). Pack a piece in a cast-iron box containing material such as powdered charcoal, charred bone, charred leather, slacked lime, sand, fire clay, etc. After heating the box and contents they should cool slowly.

- (b). Building box from brick in blacksmith fire, heat steel and cover box and tool with coke. Cool over night.

- (c). Heat the steel to red heat and bury in dry sand, hot ashes, lime or sawdust, and allow it to cool.

- (d). Water annealing is done by slowly heating the steel to cherry red, withdrawing from fire, testing degrees of heat with a pine stick and, when the stick ceases to char, plunging the steel quickly into soapy water.

Pieces annealed in this manner are found

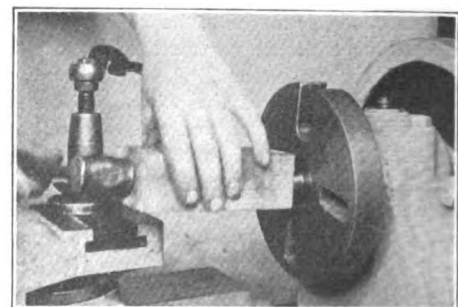


Fig. 4. Centers Should Be Placed in Their Sockets Accurately.

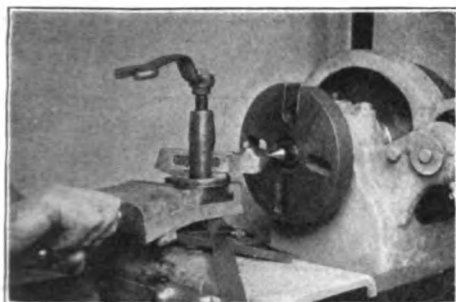


Fig. 6. Showing One Method of Redressing a Lathe Center.

much softer than if annealed by the other methods.

A reference to Fig. 3 shows the operator placing the heated center in a box of hot ashes for annealing.

When heating the lathe center, exclude as much air as possible from the steel to prevent oxidation, which causes a scale to form on the body of the steel. After the center has cooled down so it can be held in the hand, which requires several hours, it can be cooled completely by holding in water.

Before placing the center in the socket, which fits in the spindle of the lathe, it is always advisable to draw file the body of the center to remove any irregularities that may have developed in the annealing operation. The center should be wiped off clean with an oily rag before fitting into the spindle.

The best way to place a center is shown in Fig. 4. With a block of wood to act as a driving cushion, the center is securely placed. This eliminates all danger of im-

proper fitting when it is turned to shape and to trueness.

Truing the Center by Turning.

It is often necessary to remove the line center from the spindle. This is especially true when using the chuck for radial turning or boring, or when it is required to place a bar of stock through the hollow spindle of the lathe to be held in the chuck for turning. It is obvious that the center should always be replaced in the same position as it was when it was redressed.

To make it possible to do this, witness marks are placed on the spindle socket and center, as shown in Fig. 5. When the center is replaced, the witness marks are arranged to be in the same relation as when they were cut with the chisel.

The annealed center is now turned to the

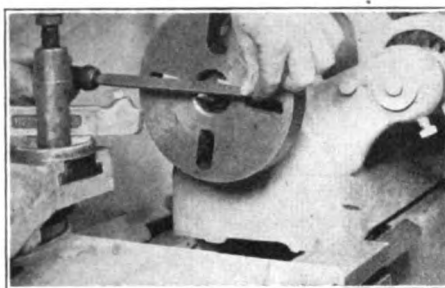


Fig. 7. Remove Tool Marks With Dead Smooth File and Polish With Fine Carborundum Cloth.

required 60-degree angle. This is done by adjusting the compound rest, with the bevel protractor at the required angle. Then a round-nose tool is set so the highest point of its cutting edge cuts at the extreme point of the center. The tool

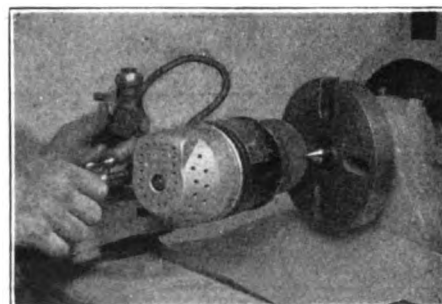


Fig. 8. Electric Grinder is Held in Tool Post and Adjusted to Position.

is then fed across the center, in the manner shown in Fig. 6, with the compound-rest handle.

If a lathe is not provided with the compound-rest, the center is turned by using a side tool. This side tool should have a cutting face as wide as the conical surface of the center to be turned. The tool is set in the tool post at the same angle as the old center. This necessitates several trial settings before the desired angle of 60 degrees is obtained. To get the best service, a lathe center should be very highly polished. This is done to reduce the friction between the center and the stock being supported.

As shown in Fig. 7, the newly-turned center is smoothed with a file and polished with a No. 00 grade of aloxite cloth. Care must be exercised in this operation, as too much filing will cause the job to have flat spots on it, which, of course, is detrimental and must not be permitted.

Truing Center by Grinding.

In Fig. 8 is shown the position of the

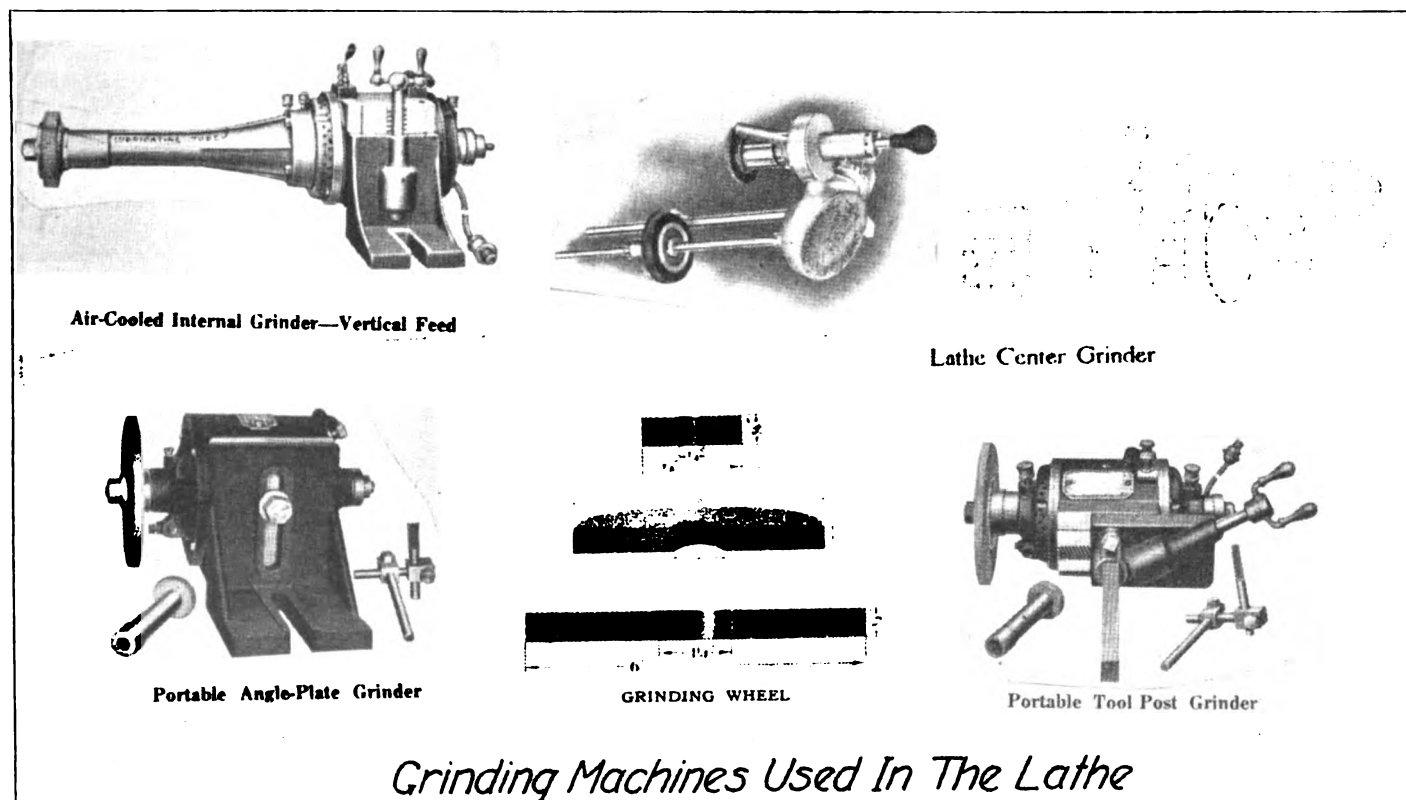


Fig. 9. Electric Grinding Machines Used for Cylindrical and Internal Grinding Operations.

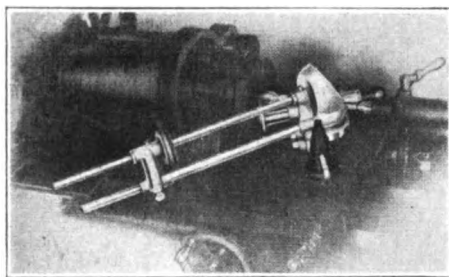


Fig. 10. Shows Grinding Attachment in Position on the Lathe.

electric center grinder when it is used to grind centers. It is not necessary to anneal the center when it is reshaped with a grinding machine. When they have an extremely delicate job to be performed on the lathe, many mechanics regrind the centers—not because the centers are not properly shaped, but because it is a positive guarantee to them that the center will run true.

The electric center grinder is provided with a shank, which makes it possible to hold the grinder in the tool post. It is fed across the work by a feeding handle. This feeding mechanism is a part of the grinder and works entirely independent of the carriage of the lathe.

When grinding, a piece of paper or a wiping rag should be placed over the ways of the lathe to protect them from the grit that comes from the grinding operation, as shown in Fig. 8. When grinding centers, the lathe should revolve at a fairly good speed and the drive belt should be adjusted to the second or third belt speed.

Electric grinders are used for many jobs on a lathe. Cylindrical and radial grinding comprise some of the most common grinding jobs, and it is surprising how accurately this class of work can be done by using a grinder such as is used for grinding centers. The job is either supported on the centers or held in the chuck, and the grinder is held in the tool post. The feed, however, is controlled from the lathe carriage and not from the individual feed arranged on the grinder. Reamers and milling cutters also can be sharpened by grinding in the lathe.

A few grinders common to lathe grinding jobs are shown in Fig. 9. Notice the grinder designed only for internal grinding. The other two electric grinders shown in this view can be arranged for internal

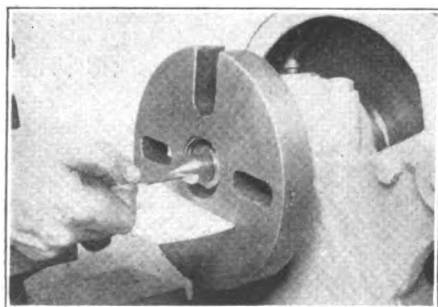


Fig. 11. Test for Proper Angle of 60 Degrees Made With Center Gage.

grinding by a very simple attachment and are the best types of grinders for the service station repairshop.

The grade of wheels used on the type of grinding done on the lathe are aloxite—grit 50-60, grade M-N bond vitrified for steel—and carborundum—grit 24-36, grade NP bond vitrified for cast iron. It pays to buy good wheels and of the proper grade and grit.

Natural and Manufactured Abrasives.

Briefly speaking, a grinding wheel consists of crushed abrasive, or cutting grit, held together by an adhesive substance known as the bond.

Abrasives are of two kinds—natural and artificial. Of the natural abrasives, there are emery and corundum. These are both of a mineral substance and alike, except that emery is not as pure as corundum.

Of the artificial abrasives, we have alundum, crystolon, carborundum, carbolite, aloxite, adamite, borocarbonyl and others. All of these are of comparatively recent origin, being products of intense heat in electric furnaces.

The natural abrasives are of a tougher substance than any of the artificial abrasives, but, on the other hand, they are not nearly so hard as the latter.

The defining lines as to when any particular brand of wheel should be used are hard to draw and are matters of much discussion between various manufacturers and users. It might be said that wheels of corundum, alundum, borocarbonyl and aloxite are most efficient for hard and soft steels, and those of crystolon, carbolite and carborundum more suitable for cast iron and chilled iron.

Softer grade wheels are better for hardened steel, cast iron and chilled iron than for other softer metals, for these materials are so hard that the points quickly become dulled and, in order to keep the wheel cutting freely, it is essential that they be removed from its surface.

A medium-grade wheel should be used for grinding brass or bronze, for a hard one is very apt to fuse the chips and heat the work, causing distortion and consequent inaccuracy. Furthermore, the work is discolored by the heat generated and the wheel loaded with particles of the metal.

Soft grade wheels should be used for grinding high carbon steel, hard steel and, in many instances, cast iron.

Hard grade wheels are best for working upon annealed carbon steel and soft steel, for the reason that the cutting points of those of medium and soft grade break away before they become dulled.

Water is used in grinding principally to keep the work cool and prevent distortion, which results if the temperature of a piece is allowed to change while it is being ground. It also serves to wash the particles of metal and loose abrasives from the

surface of the wheel, keeping it clean and free cutting.

Ordering Grinding Wheels.

It is the practice of most grinding wheel manufacturers to attach some kind of a tag to each wheel, giving its complete specifications. Where there is a probability of using more than one wheel of the same kind, it is a good plan to save this tag and, when a duplicate is wanted, the tag can be mailed to the manufacturer.

This facilitates quick delivery and insures the new wheel being exactly like the old one. If the tag has become lost, a piece of the wheel it is wished to duplicate should be sent if possible.

Specifications that are necessary to the manufacturer in order to furnish any given wheel, when neither of the foregoing methods can be followed, are:

Composition.....(Whether corundum, alundum, carborundum, etc.)

Process of manufacture.....(Whether vitrified, silicate, or elastic.)

Outside diameter.....Thickness.....

Diameter of arbor hole....Grain....Grade

.....Shape.....(If a special shape is re-

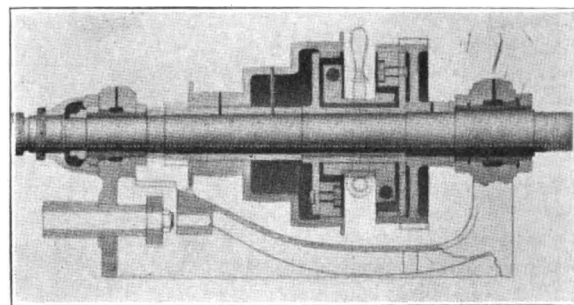


Fig. 12. This Sectional View Shows the Lathe Head Stock.

quired, the shape number given in the catalog should be specified or a sketch included with order. Otherwise, a wheel with straight face and of uniform thickness will be furnished.)

When it is desired to leave the selection of the proper wheel to the wheel manufacturer, or some other expert on grinding, a sample of the work it is proposed to grind should be furnished, if possible. When this cannot be done, the following information should be given:

Kind and size of machine.....
(Whether cylindrical or surface grinding and maker's name.)

Material to be ground.....

Number of thousandths to be removed....

Description of piece.....(Also drawing, if possible.)

Production desired

Quality of finish.....(Is work to be ground for accuracy or simply for finish, or both?)

Machine to be operated automatically or by hand?

Work to be ground wet or dry?.....

Another method of grinding centers is shown in Fig. 10. This grinder gets its
(Please turn to page 35.)

Welding, Cutting and Brazing Practice

Repair Welder Probably Called Upon to Weld Cast Iron More Frequently Than Any Other Metal—This Article Outlines Procedure for Such Work Giving Due Regard to the Differences in Torches and Welding Equipment

By David Baxter

Last month we discussed the manipulation of the oxy-acetylene flame and filler rod in their relation to welding in general. In this we endeavored to keep in mind the viewpoint of the beginner—especially in connection with the automotive repair industry.

In succeeding articles we will take up the various commercial metals and see how they react under the welding flame—including, also, the commoner methods employed in flame and filler manipulation for each class of metal. General ideas of the subject will be considered first and, later, specific instances of the welding of each of the metals discussed.

The repair welder is probably called upon to weld cast iron more frequently than any other metal. Therefore, let us consider it first, with all due regard for the difference in torches and other welding equipment in the average shop. At best, we can give but an abstract of so large a subject.

With many welders of today, good welding of cast iron is considered very difficult. This is due mainly to a lack of the necessary technique of flame and filler manipulation and an understanding of heat reactions—also, perhaps, to a lack of thoughtful and systematic study.

Taking everything into consideration, cast iron is one of the easiest metals to weld—or, rather, the best results are achieved on this metal if the work is properly executed. Generally the weld is superior in quality to the rest of the casting.

When everything is taken into account, the difficulties in the way of good cast-iron welding are neither numerous nor insur-

mountable. They may be classed under two general heads: To produce soft welds, and to prevent breakage when the welded job contracts. The remedy for the first, no doubt, lies entirely within the realm of

solved in the metal makes it very hard and difficult to machine. Then it is known as white cast iron. In the other extreme it is known as gray cast iron and has most of the carbon in a free state. It is soft and easy to machine.

Between the two are varying grades of hardness which are not accurately controllable by the average welder. However, the majority of castings upon which the welder may be called to work are of gray iron. In fact, the automotive welder will scarcely ever be called upon to weld white iron castings.

But it should be said here that soft gray iron is readily changeable to hard white iron. The execution of the weld may be such that it will bring about the combining of carbon and iron in such a way that the gray iron is changed to white. This may be due to several things, such as incorrect flame adjustment and manipulation or rapid cooling of the fused metal—the latter being known as chilled iron.

Non-technically speaking, gray cast iron takes on another degree of hardness with every time it is re-melted. Therefore, the welder may make the weld hard by using a filler rod that is only fairly hard. So he should insist upon filler metal of great softness and, in fact, should use only that kind unless for a special purpose, such as building up wearing surfaces where they may be machined with an emery wheel. This is seldom, because hard iron is lacking in strength.

The welder should school himself to know the soft grades of filler as they come from the manufacturer. He should learn to dis-



Fig. 1. Arrow Indicates Movement of Flame—Left to Right Around Filler Rod.

flame and filler manipulation, while the latter is almost entirely controlled by correct heating methods.

Lack of space forbids a discussion of the expansion and contraction problems as they apply specifically to cast iron, although flame and filler manipulation has considerable bearing on the subject. We shall confine this discussion to the handling of flames and filler metals, in relation to the production of strong, clean welds—welds that are to be machineable and free from impurities.

The name "cast iron" is applied to the metal alloy of carbon and iron, in which the proportion of carbon is between 2.5 and 6 per cent. In other words, such metal as is used in the making of gray iron castings. It cannot be forged or drawn. Consequently, castings of this metal are only obtained by casting, viz., pouring the metal, after melting, into the desired shape. Some articles are made of cast iron by machining or cutting the desired shape out of a solid body of metal.

Without going into the scientific phase of the subject, we may say that the carbon content and its nature controls the quality of cast iron. That is, the carbon can be present in differing states and thereby influence the quality of the iron to various grades of softness or hardness.

In one extreme, carbon combined or dis-



Fig. 2. Arrow Indicates Flame Traveling From Right to Left—Rod Stationary.



Fig. 3. Movement of Flame When Welding is to the Left.

tinguish the glazed, grainless appearance of the glass-hard iron from the glittering grained fracture of soft iron. Also the intermediate grades between the two extremes.

There are few practical tests for him to apply to ascertain the softness of filler

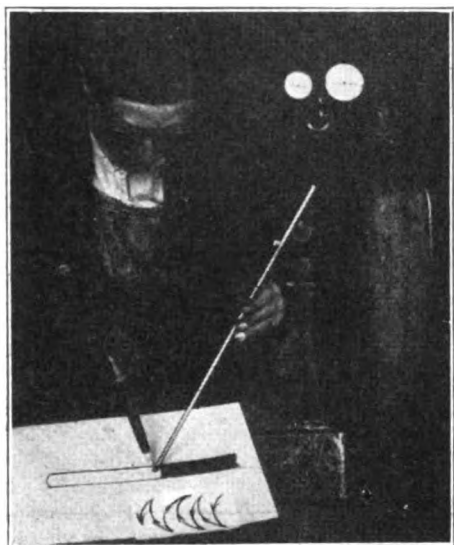


Fig. 4. Indicates General Movement of Flame When Welding is to the Right.

metal. None of them is as soft as the original metal from which they were cast into rods, on account of the chilling effect of the molds into which the molten metal was cast.

Rapid cooling, or cooling in the open, tends to cause the weld to be hard, even where it is made of good soft iron. On the other hand, slow, covered cooling tends to free the carbon and thereby soften the iron.

Silicon, when in the form of ferro-silicon, introduced into cast-iron welds, tends to alloy with the iron and compel it in some way to take the form of graphite and thus aid in the softening of the metal. On the other hand, manganese opposes the precipitation of graphite and leads to white iron.

Slow cooling is under the control of the welder. The introduction of silicon is attained by purchasing only such filler rods as have a high silicon content, but the manganese element is harder to handle because it is often present in cast iron in quantities sufficient to cause hard iron to form during the welding process.

Beside these factors, we will find that the phenomena of oxidization, decarbonization and volatilization are all conducive to the formation of white iron. These are under the control of the operator, through flame and filler rod manipulation. That is, he can handle the flame and rod in such way as to eliminate the defects to a large extent, but he may also cause or aggravate them by a poor or incorrect flame adjustment and manipulation.

Oxidizing is caused, or at least aggravated, by the incorrect adjustment of the flame. Oxidization sets in as soon as the

metal is heated, and becomes more violent as the melting point is attained. This is due to the action of the oxygen in the atmosphere, and is more than doubled if the flame carries an excess of oxygen.

The oxide thus formed has a higher melting point than iron and cannot, therefore, be melted and swept away as is the case in steel welding. It forms a crust or skin entirely surrounding the portion exposed to the oxygen. It is necessary to destroy this oxide in order for the metal to flow together. It also burns the carbon and tends to the formation of white iron. If the flame is hot enough to melt the oxide, it will destroy more of the iron and form more oxide, so the welder will find it nearly useless to try to remove the trouble with the flame.

The silicon in the filler rod helps to destroy oxide and also to prevent decarbonization of the metal. Thus it prevents blow-holes and porous spots. Part of it disappears in the course of the welding and acts as a deoxidizer, but the most dependable agency for destroying or preventing oxide—which interposes itself in the body of the weld and prevents perfect joining of the molten metals in the bath—is the flux. In reality, the flux acts as the melter of the oxide of iron.

This cleaning flux comes in the form of a powder made by mixing equal parts of carbonate and bi-carbonate of soda, to which is added 10 to 15 per cent of borax and 5 per cent of precipitate silica. Other recipes are on the market but some of them have serious faults. Borax, alone, does not seem to possess sufficient carbon-destroying qualities.

The formula given equalizes the decarbonization of the cast iron by a corresponding carbonization. The silicon of the welding rod, in effect, liberates the carbon contained in the alkaline carbonates. Thus the metal can regain from the flux what it loses by oxidization. The cleaning flux also protects the molten metal from the excessive oxidizing by the formation of a slag which floats on the surface of the molten metal.

The flux powder is applied by dipping the heated end of the filler rod into the flux pot and carrying a small quantity of the powder to the melting weld. Enough of the powder will adhere to the rod to suffice, without throwing any of it upon the weld. A better method than this is to dip the rod at frequent intervals. The beginner soon learns just how far each dip of flux will go—approximately an inch in length of the ordinary cast-iron weld.

The factors of expansion and contraction, and the necessity for preheating, have been covered in previous articles, so that the details of the flame and filler manipulation, as it applies to cast-iron fusion welding, will now be discussed.

Articles which do not require preheating should, at least, be warmed enough to take the chill off the metal around the weld by playing the flame over the surface. This

assists in starting the fusion. The total heat of fusing cast iron is higher than other metals, so it is necessary to use a flame of greater melting power.

When the flame is first applied to the weld it is given a revolving or gyratory movement along an inch or so of the prospective weld. Or, better still, it is revolved, in large circles over the point at which the melting is to start. The tip of the flame is held at least a half inch above the surface of the metal until the spot, which should be several inches in diameter, starts to turn red.

Then the flame is gradually lowered and the diameter of the circles decreased as the metal heats. When the concentrated spot starts to turn white with heat, the flame is centered upon a smaller spot which barely includes both edges of the groove or parts to be joined. It is important that the two edges melt at the same time.

But, in the melting of cast iron, the white jet of flame should ordinarily never be allowed to come in contact with the molten metal. The usual distance is about 3/16-inch above the surface of the weld. The thickness of the weld varies this somewhat, however.

When the spot upon which the white cone of flame has been concentrated commences to be fluid, the filler rod, which has been dipped in flux powder, is brought in contact with the melting. The end of the rod should already have been heated and powdered during the preliminary heating of the weld.

Then, after the rod starts to melt, it should be kept in contact with the melting weld as much as possible. In fact, the metal that melts from it should feed beneath the surface of the bath and never drip into the bath.

In a line of welding, it is kept near the center while the flame is played around it. Thus the heat reaches all sides of the rod

(Please turn to page 38.)



Fig. 5. Indicates Movement of Flame in Preheating; Also Flux Adhering to Rod.

Shop With Equipment Wins the Race

And This Is a Story of a Man Who, Having the Equipment With Which to Do Good Work, Had Customers Coming to Him From Neighboring Towns Because Their Own Local Shops Were Not Prepared to Give Them Service

By J. N. Bagley

It was one of those hot, scorching days in July when our little touring party in three cars came across the barren sands of western Kansas. All day we had driven on a high table-land and, though sandy, it was practically level.

About four o'clock in the afternoon we



Fig. 1. Before Refacing.

sighted—away to the south—a long chain of hills dotted here and there with clusters of green shrubbery. The hills were directly in our path and we were, in a way, glad they were for it would break the monotony and give us a change of scenery.

When we left the divide, the trail broke abruptly down into a low, flat bottom, green with vegetation of all kinds. Here we crossed a small river and swung to the left to go up a long hill. As we rounded the curve, I looked back and saw that one of the three cars was missing from sight.

When we had reached the summit of the long hill, we stopped and looked back into the valley below but no third car was visible on the trail. We waited for some 30 minutes and were about ready to take one of the cars and go back in search of the missing car when we sighted him, crawling along at four or five miles per hour, a mile or two back on the table-land.

In the course of half an hour he came down into the valley, over the bridge, and made an attempt to make the grade and failed. We drove back into the valley and found that his engine had no compression and was very hot—in fact, it was so hot it was smoking. While we were waiting for it to cool sufficiently to try to diagnose the trouble, a shepherd dog darted into view from the direction from which we had just come, followed by a lad on horseback.

He stopped his horse alongside of us and, pushing his hat brim out of his eyes, inquired if we were "traveling er what?" One of the party advised him that we were not traveling but soon would be when we could locate the trouble.

"Gosh darn, Mister," he ejaculated, "if you can't fix er, get Peg—he's a bear cat on them autos."

"Who is Peg?" I asked, "and where does he hold out?"

"Peg Willis. We all call him Peg, for he has a peg leg, but that don't interfere with his fixing cars. He fixed Dad's car so it just purrs like a kitten."

Jack looked up from behind the hood, where he had been carefully scrutinizing the trigger and springs, and asked the lad where this Peg bird held out and if he had a telephone.

"He runs a shop down at Duckerville. He ain't got no phone, but I'll go and tell him. It ain't only about a mile from right here, and while I'm gone you can use my fish poles and get yourself a dandy mess of fish. They're over there under that big tree." As he finished speaking he pointed to a large cottonwood tree standing on the bank of the creek, a few rods above the bridge.

"Any bait there?" inquired Jack, showing new interest.

"Darn right," returned the lad. "Bugs and worms and everything and ——" Before he had finished speaking, Jack handed the lad 50 cents and told him to get "Peg."

It was nearly sundown and Jack began to unpack and drive tent stakes, remarking: "Me for fish. Don't turn another wheel tonight."

In about 20 minutes a little, built-over affair that resembled an automobile came into sight followed by the lad on horseback.

Peg came up with a grin on his face

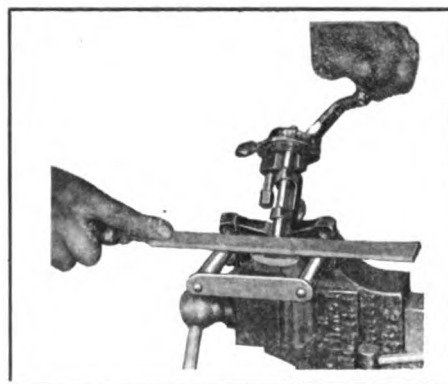


Fig. 2. Showing How Valve Was Placed.

that was, at least, three inches long and looked the party over. Then he wanted to know what the trouble was.

"That's what I got you for," answered Jack. "I can find out all right," he replied, still holding fast to the grin.

"Go to it, Peg," replied Jack. "I'm going fishing." And he started for the creek.

Peg spent a few minutes looking about under the hood. He then got the crank and tried the compression, at the same time listening closely.

"Valve trouble—that's easy," he began.



Fig. 3. After Refacing.

"I'll have to take them out but it won't take long."

"Do it here, or take it to your shop?" I asked. "Right here," answered Peg. "I always fix them just where I find them when the weather is good. No use spending time dragging them around."

He brought his little tool kit from the freak he drove up and began work on the car. I knew in a minute that the lad was right when he said Peg was a "bear cat." The "box," as he called it, contained one of the best sets of tools I ever saw brought to the field for repair and Peg knew how to use them.

When he had removed the valves they were badly warped from the engine's overheating, and I asked him if he intended putting in new valves.

"Naw," he replied, "them valves are all right. You just wait until I have finished them up a little and I'll show you a real fitting valve." And he did. The car was two years old and the valve seats were worn down quite a little. The valves were as shown in Fig. 1.

He took from his kit a little arrangement that he called a refacer and clamped it into a vise attached to the back end of the "buzzard" he called a car. The valve was placed as shown in Fig. 2 and, with the file, the valve was refaced in about two minutes until it looked as shown in Fig. 3. As the old saying is, "before you could say 'Jack Robinson,'" he had all twelve of the valves refaced ready for regrinding.

He next took from his little kit a tool, such as is shown in Fig. 4, and re-cut each of the valve seats in about the same length of time that he refaced the valves.

He explained how, in re-cutting the valve seat, the surface was too wide and pro-

ceeded to use another cutter with a 30-degree angle, removing some of the metal from the top side as shown in Fig. 5. He continued this cut until the cut at the top was about $\frac{1}{8}$ -inch larger in diameter than

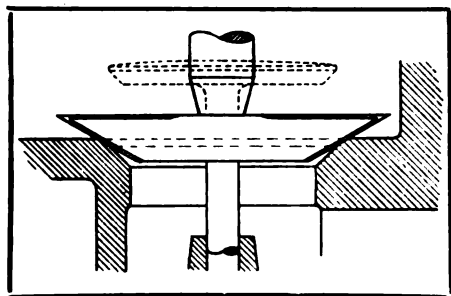


Fig. 5. Cutter With 30-Degree Angle Removes Some Metal From Top Side.

the head of the valve that he was repairing.

He then took a third cutter, Fig. 6, with an angle of about 60 degrees and cut away the metal below the seat proper until it looked as shown in the illustration in Fig. 7, leaving the narrow seat between the 30-degree and 60-degree cut.

When he had finished, he carefully wrapped the little tools and placed them in a box, saying that the regrinding of the valves was next. So far, the job was very interesting, to say the least. I enjoyed it much more than Jack did the fishing, although he did get a nice string of channel cat which averaged about one pound each.

Figs. 8 and 9 show more clearly the simple tool he used for re-cutting the seat.

The next operation of grinding was still more interesting than any of the operations, inasmuch as he employed a unique method which I have never seen before or since.

Peg ran the front end of his "tin buzzard," as he called it, up near to Jack's car, raised the hood and slipped the fan belt off. He took from his tool box a queer looking affair and clamped it above the engine. To this was attached a flexible shaft. A longer belt replaced the regular fan belt and the machine was ready for use.

Peg started the engine and the flexible cable inside the flexible housing—resembling

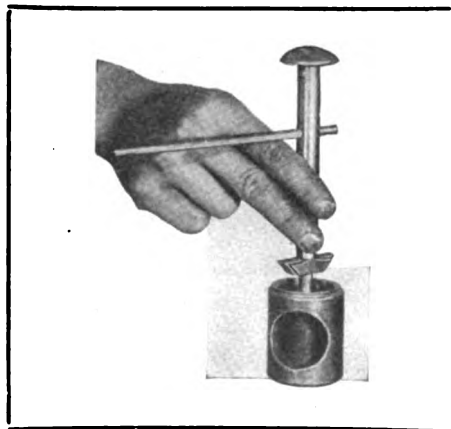


Fig. 8. One View of Tool Used for Re-Cutting the Seat.

very much the speedometer cable—started revolving. On the end of the cable was a sort of a control device, by which he could start and stop the revolving cable at will.

He selected from his kit a little tool that

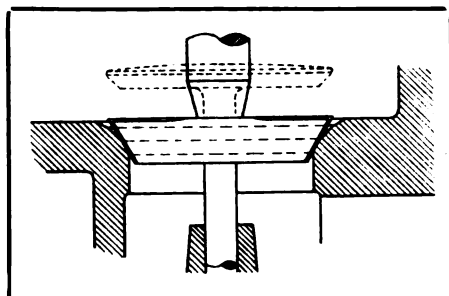


Fig. 6. Cutter With 60-Degree Angle Cuts Away Metal Below Seat Proper.

fitted the top of the valve, secured it to the end of the shaft, and prepared his valves for grinding in the regular way.

When he had finished, he started the motor and let it run for a few minutes until it was thoroughly warmed up, when he stopped it and adjusted the tappets with a thickness gage. He then set the locking

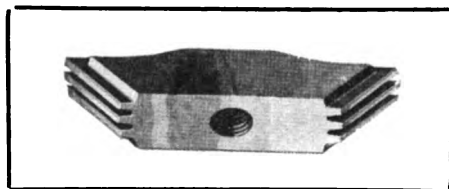


Fig. 4. Each Valve Seat Was Re-Cut With a Tool Like This.

nuts up tight, recovered the valves, and tried the car out by driving it up the long incline which lay directly in front of us up the trail.

It is needless to say that it made the grade without difficulty, and Jack declares that it runs and pulls better than it ever has before.

Out of mere curiosity, I drove down to this little town of Duckerville to see what was there. It was an inland town with a population of about a dozen people, I should think. There was one general store and post-office, in combination with a spattering of drugs in the rear. A small confectionary, barber shop, one or two other offices, and Peg's garage constituted this town of Duckerville which was about 20 miles from a railroad.

To drive by this shop of Peg's would arouse no curiosity at all—in fact, when one looked at the place, it is very doubtful whether or not a stop would be made unless the motorist was stranded.

But once you go inside the place, things take on a different aspect. The building was about 20 feet by 40 feet—wood throughout, with cement floor. But such an equipment I never saw in so small a town. There were two lathes, drill press, shaper, small milling machine, jacks, hoists, and small tools galore. Every tool had a place and

was in it. I never saw a better equipped workshop in the city.

I asked Peg why he did not go to a larger place, for he could get all the work he could do there and employ two men as well.

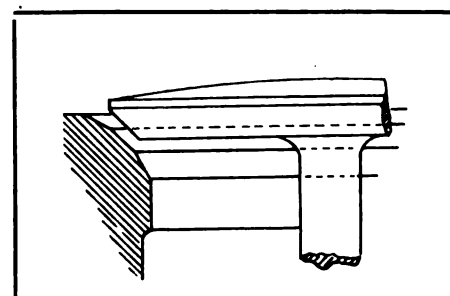


Fig. 7. Narrow Seat is Left Between the 30-Degree and 60-Degree Cuts.

"Well," he remarked, surprised, "I employ two men now all the time, so why should I go to a larger place when folks come all the way to me from good towns on both sides of me?" And he was right at that. But this only goes to prove that, no matter where you are, if you have something better to offer the world will make a beaten path to your door.

Peg told me that hardly a week goes by that he does not make from one to three trips to the larger towns with his "tin buzzard" and tool box in order to do a job of work.

One of the towns of 2,800 inhabitants, to which he referred, was situated on the trail 22 miles north. When we reached the place, I took particular pains to take a look at each of the three garages and the three together did not have as much equipment as Peg had in his little shop.

I had an occasion to go into a clothing store on Main St. and, while there, told the merchant I needed some car work done and asked where I should go.

He said that there were three places in the city to which I might go and, looking around quickly to see if any one was near, advised me in a low tone that if there was any serious trouble to go down to Duckerville and get a first-class job at a very

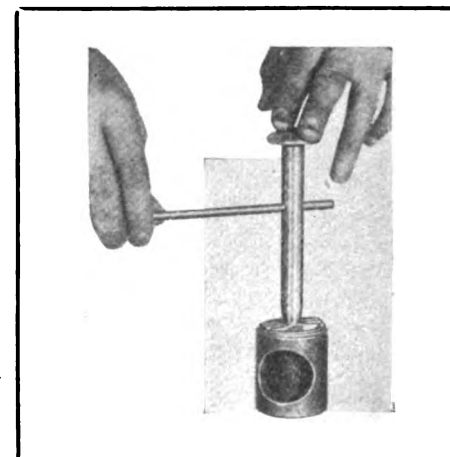


Fig. 9. Another View of Tool Used for Re-Cutting the Seat.

reasonable price. He told me that he got the most of his work done there or had Peg come down.

"You don't believe in boosting your home boys then?" I asked.

"I most certainly do, but when I pay my good money I want something in return. I have told each of the garage-owners here that, just as soon as they get equipment and some one to use it, I will not go to Duckerville again."

This is just another instance where shop equipment wins the race. It is simply out of the question for the curbstone repairman to longer exist, or the garage without equipment to make more than a bare living.

Car owners are beginning to realize that a shop without equipment cannot turn out work equal to the one that has equipment and are taking no chances. They drive a car that may represent an investment of anywhere from a Ford to a couple of thousand dollars and they do not care to have "screwdriver" mechanics work on them when real mechanics may be had by going out of their way a trifle.

The garage dealer without equipment may not realize that this condition exists to any extent, but if he will investigate carefully he will be surprised to find that many of the fellows whom he actually believes are his customers are going elsewhere for the more particular jobs—the jobs that actually pay a profit.

The tools referred to in this article, Peg tells me, may be had from almost any jobber and are not expensive. It is just a matter of getting and using them, and I think any reader of the *AMERICAN GARAGE & AUTO DEALER* will do well to look into the shop equipment situation from all angles and invest in the tools necessary to keep the repair business in the territory where it belongs.

TRUING LATHE CENTERS AND TURNING.

(Concluded from page 30.)

power from the cone pulley. The method of setting it up is shown. This view gives a fairly good idea of how this style of grinder is used. It cannot be used for any other purpose than grinding centers, and it is for this reason that an electric grinder will be found much more serviceable than this tool in the service shop.

Lathe centers are tested after grinding or turning for the proper angle, as shown in Fig. 11. Here the operator is testing the shape of the center with a center gage. Notice the paper held underneath, thus making it possible more accurately to see the angle relation of the center and gage. If the grinder or tool has been properly set in its respective operation, the center gage will show a correct fit on the center.

To give some idea of the supporting of the line centers the sectional view of the headstock of a lathe is shown in Fig. 12. The rigidity of the spindle which carries the center is one of the important factors

governing the accuracy of a lathe. In this view can be seen the two main spindle bearings. If these bearings become worn, tapered and inaccurate work will result.

(To be continued.)

ANOTHER RECORD BREAKING SHOW.

(Concluded from page 14.)

gested, he believed the aggregate increase in business, on a basis of a \$1,000 minimum gain for each dealer, would be \$1,000,000. He suggested that the slogan: "One Salesman, one dealer, one million dollars," be chosen for the campaign. The spirit in which this suggestion was received showed that the jobbers were thoroughly in accord with Director Sherman's ideas, and many of the sales managers present agreed to put the plan in force in their respective organizations.

Director Sherman also told of the results obtained with the "Ask 'Em to Buy" and "Shop Profits" phases of the merchandising campaign. He told of numerous jobbers who had reported appreciable business gains through their support of the movement in their territories, some of them holding meetings where the films were shown and others working individually with their dealers, while still others combined the two plans.

He pointed out that the principal work to be accomplished was in bringing all dealers to a realization of the fact that every car coming to a dealer's or a garage-man's door is a market for both merchandise and service and can be made a profitable market for the dealer through sales effort.

"Stimulate your dealers to work for the sale of accessories as Christmas gifts," urged Director Sherman, and mentioned the use of window and counter cards, stickers for mail matter, sales letters and circulars illustrating automotive gift ideas as helps which jobbers can put into the hands of dealers with which to build holiday business.

The applause and the promises of support which Merchandising Director Sherman received were indicative of the increased activity in sales promotion work which may be expected during the next six months.

Mr. Sherman also requested the support of sales executives, in his talk to the manufacturers' divisional meeting, in order to emphasize to the retailer how he can make profits through selling or using the manufacturer's product, and he particularly urged that each manufacturer member of the association get out at least one piece of printed or illustrated matter in the next six months that would be devoted entirely to this idea.

Many of the association members agreed to get actively into the merchandising campaign, and join in the work to broaden the market for the industry's products by aiding the retailer to a better understanding of the possibilities of service to his public and greater profit to himself.

An interesting point was brought out in one jobber's report, which showed that the "Ask 'em to pay" suggestions had been especially helpful to dealers.

The "Open" and "Closed" show question which had been a matter of some dispute between jobber and manufacturer members, was satisfactorily settled through the adoption of a resolution offered by William E. Wissler, the new vice-president of the association.

Therefore, the fifth annual show, which will be held next November in the Coliseum at Chicago, at the same time as the eighth annual convention, will be open for exhibit purposes to member manufacturers only. On the jobbers' side, it will be open also to members only, with the exception of those jobbers whose names are approved by the board of directors.

Nelson H. Oliver, general sales manager of Metal Specialties Mfg. Co., Chicago, was chosen as the new president of the association; William E. Wissler, manager of automotive equipment department of the Herring Motor Co., Des Moines, Iowa, is vice-president; and Earl V. Hennecke, general sales manager of Moto-Meter Co., Long Island City, N. Y., becomes chairman of the board of directors.

SELECTION OF EQUIPMENT FOR TIRE SHOP.

(Concluded from page 19.)

dividual preference and the room available will have much to do with their design.

A stock bench is essential. This is used only for cutting new materials and must be kept clean at all times. New materials come in rolls and a rack, capable of holding a number of these rolls, should be built at one end of the stock bench. A drawer in the stock bench can be used to hold scissors, scale, pencils and other small tools used at the bench. A bench 42 ins. wide, 48 ins. long and 30 ins. high will suit the ordinary repairman.

A number of mandrels or lasts are needed for the cutting-down and the building-up benches. These consist of a cast bracket, which bolts to the table, and a cast arm which fits inside the tire. The arms are made in sizes to fit the standard tire sizes and are interchangeable on the bracket. One 3-inch size will be needed, as will several 3½-inch and 4-inch lasts. Probably one each of the 4½-inch, 5-inch, and 5½-inch sizes will meet the average need.

Boxes for holding scraps and tools, and for other purposes, will be obtained as their need is apparent. Other small equipment may be made to help the individual workman.

Many makes of vulcanizing equipment are on the market, and almost any of the standard makes will give satisfactory service if properly installed and completely operated. Poor or cheap equipment is false economy—only the best should be used. Results are determined not only by the skill of the repairman but by the quality of the equipment.

Quit Stumbling Along

Make this your New Year's resolution: To quit stumbling along, to stop all leaks and to take all profits.

That's what everyone in the automotive business wants to do and aims to do every year, yet 28% failed outright in 1921. WHY?

Because good resolutions, even when backed by painstaking effort, will NOT assure business success unless they are also backed by a system that stops leaks and unfailingly returns to you full profits.

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Comfort Printing Specialty Company,
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In February I installed one of your bookkeeping systems. As the season progressed I found more and more value in this system. Now as the year draws to a close I can go to my ledger and make up any kind of a statement I might be called upon to make, and know that it is accurate.

I realize the extreme value of the ledger in making out income tax returns. With its separate departments your ledger is very simple. Even a trial balance is easy to make. What appeals to me mostly is the fact everything is in one book. In case of fire all one needs to do is to just grab this book and all his year's business is saved.

The system has made money for us in this business by teaching us to know where every dollar goes and what it goes for and which department is making the most money. The entire system takes less than a half hour a day to keep up.

Yours very truly,

CROFT BROTHERS GARAGE

You MUST have day by day knowledge of your business transactions in order to prevent profit leaks.

And, you do not need a special education to conduct your business profitably.

COMFORT'S OFFICE RECORD

—a one-volume bookkeeping system, makes profit leaks impossible. It virtually tells you what to do about every department of your business. A child can understand it. This system was devised for your business only, to meet *all* the accounting problems that occur in your shop and your office every day.

Read what Croft Brothers say about the Comfort Office Record. Here are men in your own line having the same problems that you have. What they say has been said and is being said by hundreds of other users of the Record. Use is the best proof of value.

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109 North Eighth St. St. Louis, Mo.

Stop Those Profit Leaks

The cause of business failure is not **always** poor business conditions. Often failure is caused by preventable profit leaks. Many of the failures in the automotive business were traced directly to lack of system — profit leaks that would have been impossible with COMFORT'S OFFICE RECORD in use.

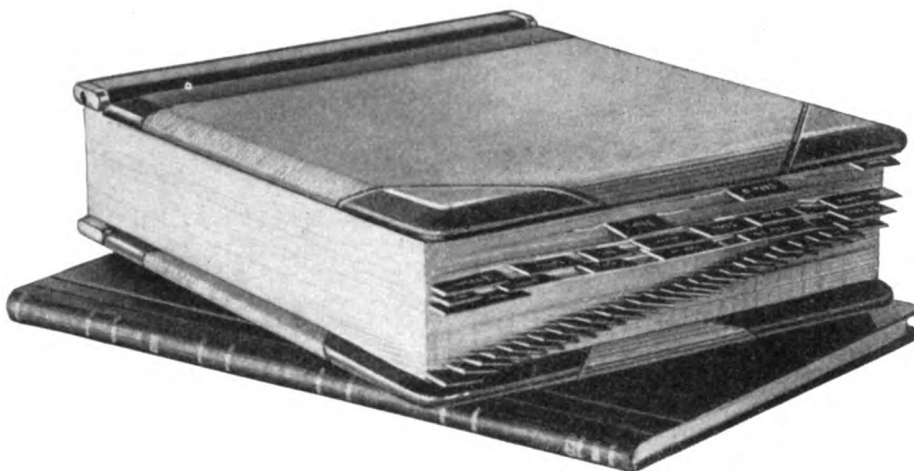
You should see this book before starting the New Year. If you will mail us your check for \$25, the cost of the complete system, we will send it to you with the privilege of returning it to us within ten days if you think it does not suit your business. We will return your money and the whole transaction will not cost you a penny, because we pay all shipping charges both ways.

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Welding, Cutting and Brazing Practice

(Concluded from page 32.)

as well as both sides of the groove. This method is particularly advised for heavy metals. In the case of thin pieces, the rod is melted by sweeping the flame over the melting metals.

To avoid adhesion, due to blowing the molten metal along the beveled groove where it is not hot enough to receive the filler, the torch should be held so that the flame strikes the metal nearly perpendicularly. Careful judgment should be exercised here as to the melting and mixing conditions within the weld—such as was described in the chapter on general flame manipulation. Usually the flame blows in the direction of the welding, but not strong-

ly enough to blow the melted metal ahead.

In Fig. 1 the movement of the flame from left to right, around the end of the melting filler rod, is indicated. Fig. 2 shows the tip of the flame passing back to the left around the filler. In this the operator is welding toward himself.

Then, in Fig. 3, the position of the flame and filler rod when the weld is made from right to left is indicated. In Fig. 4, the position when the weld is made from left to right is shown.

On heavy cast-iron welds, or where the filler is not melting fast enough to supply the needs of the melting groove, the flame is alternately passed up and down an inch

or so of the rod in order to hasten melting.

Illustrated in Fig. 5 is the fluxing and preliminary heating. The rod has been dipped in the flux powder and is ready to be applied to the weld as soon as it is ready to be filled.

The illustrations are a combination of photograph and line drawing, the idea being to make clearer the flame and filler movement by using an actual torch in connection with the graphic method.

The many little details in the technique of welding cast iron, which are omitted from this article, will be taken up later when we discuss specific welding problems in this same metal.

Effect of Temperature on Gasolene

Some Interesting and Valuable Information Has Been Collected Through Experiments Made to Determine the Effects of Varying Temperatures on Gasolene—Data Given Was Furnished by Wayne Tank & Pump Co.

In conducting the experiments given in the illustrated chart, two grades of gasoline were used—a straight refinery run having a gravity of 58 degrees Baumé and a so-called high-test, straight refinery run gasoline of 65.5 degrees Baumé.

In interpreting the results shown in the chart, the following measurements should be borne in mind:

Internal diameter of cylinders, $9\frac{1}{2}$ inches.
1/64-inch change in surface level equals
1.1075 cu. ins.

1/32-inch change in surface level equals
2.215 cu. ins.

1/16-inch change in surface level equals
4.43 cu. ins.

$\frac{1}{8}$ -inch change in surface level equals
8.86 cu. ins.

One liquid U. S. pint equals 28.875 cu. ins.

An exact five gallons of each were placed in two visible pump containers inside of the building and about 12 inches from the steam pipes. Both bowls were vented but had no overflow pipes.

Temperatures of the gasoline and measurements of surface level were read as indicated on the chart.

The room temperatures were also read at the same time as the temperature of the gasoline.

When the temperature of the room was rising, it was found that the temperature of the gasoline was from one to three degrees lower than that of the room, and when the temperature of the room was falling, the temperature of the gasoline was from one to three degrees higher than that of the room.

The conditions surrounding this experi-

ment and the results obtained approximate very closely the conditions which surround the operation of the visible pump located out-of-doors.

The observations covered a total period of 40 hours.

The gasoline was placed in the containers at 4 p. m. The temperature of the liquid was 30 degrees Fahrenheit and that of the room 65 degrees Fahrenheit.

The next reading was taken at the end

of 15 hours, or 7 o'clock the following morning. The temperature of the liquid was then 33 degrees Fahrenheit and the room temperature 36 degrees Fahrenheit.

The surface level of the high-grade gasoline had dropped $\frac{3}{8}$ inch while the low grade had dropped only $\frac{1}{8}$ inch.

This would indicate that the high-grade gasoline was more susceptible to temperature changes than the low grade. Also, that both liquids had risen in temperature after

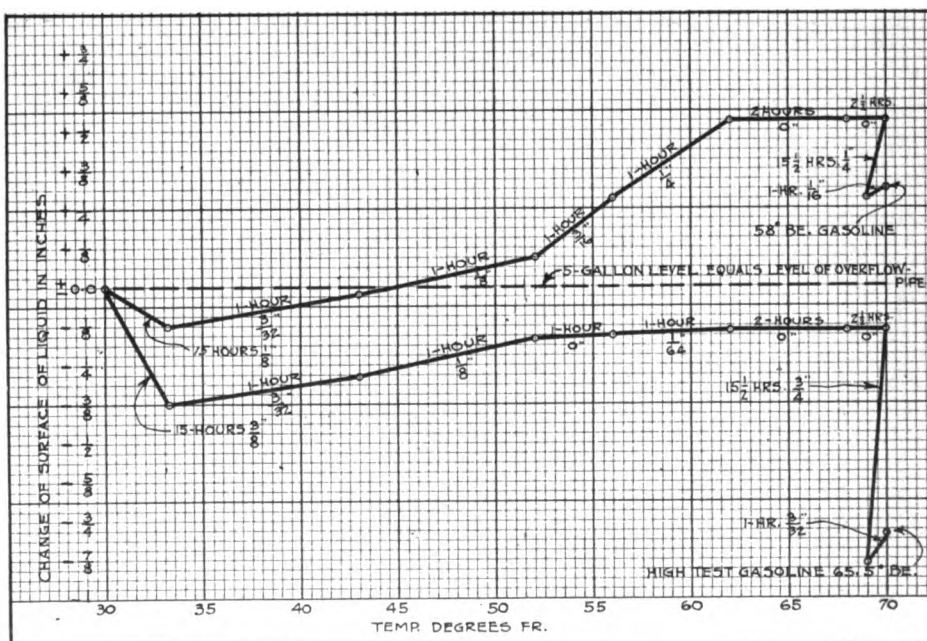


Chart Showing Fluctuation of Surface of Liquid Due to Varying Temperatures of Two Grades or Gravities of Gasolene in Visible Pump Containers. Direction of Line Indicates Rise or Fall of Surface Level.

being placed in the containers in an endeavor to reach the temperature of the room before the room temperature began to drop, due to the shutting off of the steam; that, during the first expansion, the more volatile parts of the high-grade gasoline had evaporated; and that afterward the temperature had gone considerably below 30 degrees Fahrenheit during the night.

Now, using the low-grade gasoline as an example of commercial practice: If exactly five gallons had been pumped into the bowl and then subjected to the same temperature conditions as in this experiment, a customer coming to the pump would see the gasoline $\frac{1}{8}$ inch below the line and assume that he was to receive short measure while, as a matter of fact, he would receive five gallons in a contracted form.

If the pump owner did not understand what had happened and attempted to bring the gasoline up to the line by pumping in an additional amount, he would be giving his customer over-measure by 8.86 cubic inches or 1.86 cubic inches more than the tolerance prescribed by the National Conference of Weights and Measures.

During the next two hours, the temperature increased and the surface of the liquids rose correspondingly.

In the case of the low-grade gasoline, the rise carried it over the five gallon mark $\frac{3}{32}$ inch.

In commercial practice, where the pump was fitted with an overflow pipe, 6.6 cubic inches would have been returned to the storage tank through the overflow. The customer, because the surface of the gasoline stood at the five-gallon mark, would assume that he was getting a full five gallons while, as a matter of fact, he would be getting an expanded five gallons, less the 6.6 cubic inches, or about $\frac{1}{4}$ pint.

During the next two hours, the low-grade gasoline was raised $\frac{7}{16}$ of an inch by an increase in temperature of ten degrees.

In other words, if five gallons had been placed in the bowl at 52 degrees Fahrenheit, and then raised to 62 degrees Fahrenheit, the customer would have lost into the overflow approximately 31 cubic inches, or over one pint.

During the next $4\frac{1}{2}$ hours the low-grade gasoline showed no change in surface level, even though the temperature increased eight degrees. This would indicate that this particular grade of gasoline evaporated at about the same rate that it expanded when being subjected to a temperature of more than 62 degrees Fahrenheit.

The high-grade fuel indicated an even greater rate of evaporation beginning with 52 degrees Fahrenheit and running for $6\frac{1}{2}$ hours up to 70 degrees Fahrenheit.

The last reading for increasing temperatures was taken at 3:30 p. m. The next reading after a lapse of $15\frac{1}{2}$ hours at 7 o'clock the following morning, showed the temperature of 69 degrees Fahrenheit.

The low-test gasoline surface level had

dropped $\frac{1}{4}$ inch, or a distance equal to 17.7 cubic inches, or about two-thirds of a pint, and the surface level of the high test had dropped $\frac{3}{4}$ inch or a distance equal to over 53 cubic inches, about one quart.

This would indicate that the temperature had remained reasonably constant during the night and that evaporation had increased

| Sp. Gr... | 0.710 | 0.720 | 0.730 | 0.740 |
|------------------|----------|----------|----------|---------|
| Bc. Gr... | 67.8 | 65.0 | 62.3 | 59.7 |
| Temp. deg. Fahr. | | | | |
| 30.... | 226.38 | 226.611 | 226.611 | 226.842 |
| 40.... | 227.997 | 227.997 | 227.997 | 228.228 |
| 50.... | 229.4985 | 229.4985 | 229.4985 | 229.514 |
| 60.... | 231.0 | 231.0 | 231.0 | 231.0 |
| 70.... | 232.5015 | 232.5015 | 232.5015 | 232.495 |
| 80.... | 234.234 | 234.1185 | 234.003 | 234.003 |
| 90.... | 235.851 | 235.851 | 235.851 | 235.389 |
| 100.... | 237.006 | 236.775 | 236.775 | 236.544 |
| 110.... | 238.392 | 238.161 | 237.93 | 237.699 |
| 120.... | 239.778 | 239.316 | 239.085 | 238.854 |

Table Giving Volumetric Changes of One U. S. Standard Gallon of Refinery Straight Run Gasoline of Different Specific Gravities for Each Ten Degrees' Change of Temperature Above and Below 60 Degrees Fahrenheit.

and was more noticeable in the high-test gasoline than in the low grade.

That evaporation above certain temperatures—which vary with the density of the gasoline—is an important factor which must be taken into account when allowing gasoline to stand in glass bowls while waiting for the customer, is substantiated by the next temperature reading of 70 degrees Fahrenheit taken an hour later, but which did not bring the surface level up to the same point as of 3:30 p. m. of the previous day when the temperature was also 70 degrees Fahrenheit.

The table shown in this article gives the results of some very carefully conducted experiments showing that gasolines of different gravities do not expand and contract in the same ratio between similar ranges of temperature, and that any particular grade of gasoline will not expand and contract equally between different ranges of temperature.

For example: When the temperature was dropped from 30 degrees to 60 degrees Fahrenheit, one gallon of the 67.8 degrees Baumé gasoline contracted 4.62 cubic inches, while the low-grade gasoline 59.7 degrees Baumé contracted 4.158 cubic inches.

Similar conditions are set forth when the temperatures are increased.

Again, in the case of one grade of gasoline only, the 67.8 degrees Baumé gasoline had a contraction of 4.851 cubic inches when the temperature was reduced from 90 degrees to 60 degrees Fahrenheit or 30 degrees, and when reduced an additional 30 degrees or from 60 degrees to 30 degrees Fahrenheit, it contracted 4.62 cubic inches.

In these experiments the bowls had no outlets from the bottom whatsoever. Therefore the dropping of the level of the surface of the liquid was not due to leaking back, and is conclusive proof that, in com-

mercial practice, the dropping of the level is not due to leaky valves but is due to contraction and evaporation.

The figures in the table are the result of experiments conducted in such a manner as not to be affected by any evaporation.

These experiments prove conclusively that temperature has a very marked effect on gasoline. No retailer should be permitted to dispense gasoline from above-ground containers if the liquid has been allowed to stand in the container before delivery.

Each measure should be served directly through the pumps to the customer's tank from the underground storage tank. Such procedure assures the gasoline buyer of accurate measure under all conditions, provided, of course, the measuring device is accurate.

New York and Chicago Shows to Be Biggest Ever Presented.

With 83 different makes of automobiles and 290 accessory manufacturers listed as exhibitors, the national automobile shows of New York and Chicago will be the biggest automobile exhibitions that have ever been presented in this country.

The New York show will be held January 6 to 13, while the Chicago exposition, in the Coliseum and First Regiment Armory, will be held January 27 to February 3. Both displays are under the direction of the National Automobile Chamber of Commerce.

It is understood that the national automobile shows will reveal few mechanical changes in the 1923 cars.

The Grand Central Palace will again house the New York Show in its entirety. The four floors of the Palace that will be occupied contain 200,000 square feet of space, as each floor is equal to a city square block in area. For the most part, the cars will occupy the two lower floors, but it has been found necessary, because of the great demand for space, to put several of the cars on the third floor.

There have been some changes in the exhibitors' list since the show management issued its preliminary data. A revised list shows that 83 manufacturers will exhibit at New York, two concerns canceling their space. The companies which will not exhibit are the Standard Steel Car Co. and the Templar Motors Co.

Many additions have been made to the accessory list, both at New York and Chicago. The newcomers include the M. L. Bayern Co., Inc., New York; the Cord Tire Co., Chester, W. Va.; the Grigsby-Grunow-Hinds Co., Chicago; the S. S. McClelland Co., New York; the T. A. Martin Co., Inc., Bridgeport, Conn.; the Norling Rotary Engine Co., Chicago and the Walker Axle Co., Chicago.

Practical Hints for Shop Mechanics

Testing Ford Coils.

The coils of the later Ford cars, where battery equipped, are quite easy to test without any elaborate equipment. Secure a piece of copper wire, about two feet long, and attach one end to the frame of the car or ground it at some other point.

Turn the ignition switch to the "battery" position and touch the other end of the wire to the screw which holds the rear end of the vibrator spring. Watch the ammeter reading—it should be about $1\frac{1}{2}$ amperes. Touch the four coils in succession and be sure that the readings are fairly uniform.

—W. G. N., Cal.

* * *

When Ford Clutch Drags.

After the Ford has been in service for some time and the clutch plates have become worn, the clutch may have a tendency to drag. Many a mechanic has been unpleasantly surprised when, after making sure that the emergency lever was pulled back, he cranked the car and was forced to dodge when the car started towards him.

This condition can, of course, be remedied by putting in new clutch plates. Another way of correcting the trouble, and one that involves no expense for new parts, is to spring one-half of the clutch plates. This is done by placing the clutch plates, one at a time, on the anvil and peening slightly.

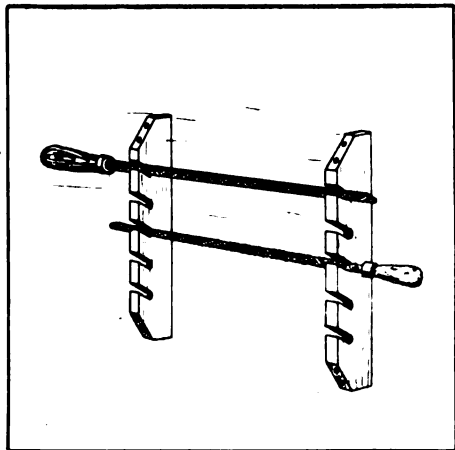
The plate will be given a slight curvature by this hammering so that the clutch assembly must be slightly compressed when the clutch is engaged. When tension is released from the plates, this slight spring causes them to push apart and prevents dragging.—M. V. W., Ind.

* * *

Handy Bench Tool.

The two illustrations show two handy things for the work-bench.

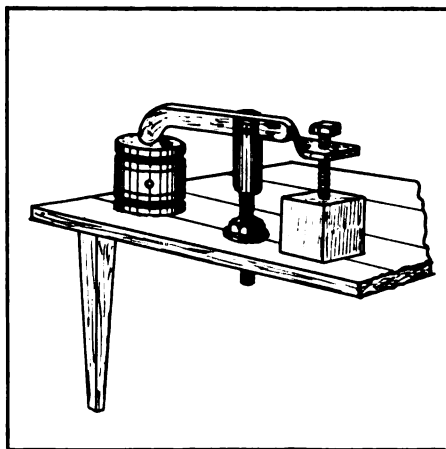
A wall file rack keeps the files handy to one's reach and prevents injury to their teeth as may happen if they are thrown



Wall File Rack Keeps Files Handy.

together in a bench drawer. The rack is easily made from two strips of board, with slots cut at an angle.

The bench clamp is also a very useful device and easily made from a bit of $\frac{3}{8}$ -inch



Bench Clamp a Useful Device.

by $\frac{3}{8}$ -inch cold-rolled steel and a large-size bolt, the head being upset and a slot cut to take the finger. A mechanic can easily get the idea from the illustrations.—C. H. W., N. H.

* * *

Use for Old Valve Stem.

We had some trouble with the new disk wheels used on the new Maxwell when it came to inflating tires with our free-air chuck, so we took an old valve stem out of an old tube and sawed off the big round end that was originally inside the tube and drilled that end to the correct size for the small end of a valve cap. We then sweated the cap into the stem.

Thereby we had a stem to screw onto the stem on the wheel, and the other end will protrude far enough to take the air chuck.—H. S. B., Fla.

* * *

Duplicating Home-Made Signs.

A sign painter is not always available in the small town and the garageman is sometimes called upon to make his own signs. Of course, plain lettering is easily done by cutting out block letters and spacing them as desired on the sign. The letters may be traced about with a pencil and then blocked in with any desired color.

Sometimes a more artistic and elaborate sign is wanted. Perhaps several of identical design will be needed. The proper design may be obtained by sketching it on heavy paper or light cardboard. Several attempts may be necessary before the desired effect is to be had, but once this is done it is easy to reproduce several identical signs.

The outline of the lettering and design

is prick-punched with a heavy pin or awl. Place the stencil against the surface to be lettered, and pat it gently with some fine pumice stone in a coarse cheesecloth bag. If this is carefully done, and the stencil removed without shifting, the outline of the sign will be marked with lines of pumice dots. Blocking in is done with brush and paint.—L. R. B., Iowa.

* * *

A Good "Squeak-Remover."

Here is a shop hint that I have found to be very easy and a good one for overcoming the squeaky automobile wheel.

I take the rim off the same as a blacksmith takes a wagon tire off to set it, and wedge the ends of the spokes. Then I saw a little off the ends of the felloe, the same as when setting any tire, cut a long strip of sheet iron as wide as the felloe, and tack around the outside of it.

Next I heat the rim—either with the welding outfit, in a forge, or with a fire on the ground—put it on the wheel while hot, and then have a wheel as good as new at a very slight cost.—C. K., Minn.

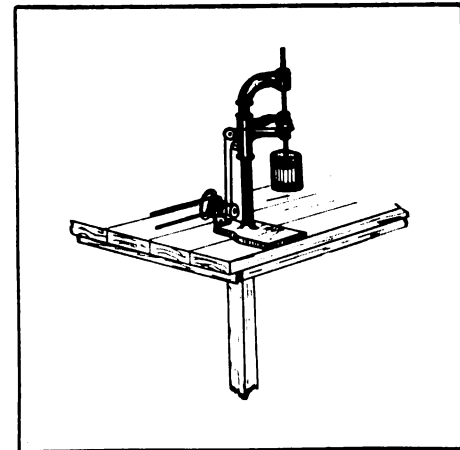
* * *

Installing New Pistons.

It often happens that you cannot get the pistons to go through the cylinders to fit loosely enough to keep them from gripping when the motor is limbering in.

If you have a power drill in the shop, place the piston over the chuck, as shown in the illustration and, by use of a fine file and No. 00 or very fine sandpaper, it can be taken down in a few seconds to the required size.

Be careful not to take too deep cuts at the ring edges where the rings fit or it may cause oil leaks to develop. This comes in handy where you do not have a lathe to chuck such for refinishing. It serves the same purpose and saves lots of lapping in of the pistons to fit them.—G. F. H., N. C.



Helpful When Installing New Pistons.

Ford Cars are Not Made to Chatter

WHEN they do they are not properly lubricated. There is no chatter to a Ford when En-ar-co (Light) Motor Oil is used and kept at the correct level; the crank case drained, flushed and refilled with fresh, clean En-ar-co Oil every 500 miles.

En-ar-co
SCIENTIFIC REFINING
MOTOR OIL

THE OIL OF A MILLION TESTS

In making En-ar-co Oils we average over a million tests a year. It is only by this multiplying of tests that perfect products can be made. This thoroughness in our Scientific Refining processes is the protection offered to users of our products.

Why En-ar-co Motor Oil is Better

All refiners make lubricants just as all cooks make biscuits, yet there is as much difference in oils as there is between the delicious light, flaky biscuits mother makes and the heavy, soggy apologies for biscuits some restaurants serve. In each case the raw materials are practically the same, but the "making" is different.

To protect and safeguard your motor, use En-ar-co Motor Oil in your auto, truck or tractor. It contains no sediment-forming impurities. It is always uniform in excellence.

Dealers Write us for particulars regarding En-ar-co Boy and Slate Sign and our unique sales plan on En-ar-co Motor Oil.



THE NATIONAL REFINING CO.

705-BI National Bldg.

Cleveland, O.

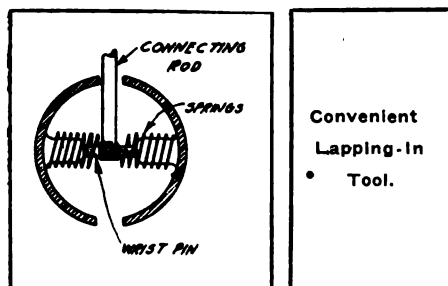
Scientific Refining—In Business 40 Years

Producers of Crude Oil, Refiners and Marketers — Four Modern Refineries—Complete Distributing Branches in 96 Cities

Lapping-in Tool.

The cylinder wall may be smoothed by the use of the lapping-in tool described. An old piston is secured and the top and bottom sawed off, leaving only the section that carries the wrist-pin.

This is cut in half, at right angles to



the wrist-pin holes, and fitted with two starting crank springs that tend to spread the halves. By placing a wrist-pin in the holes and attaching a connecting-rod for a handle, a convenient lapping-in tool is made.—L. R., Wis.

* * *

Cleaning Carbureter Float Chamber.

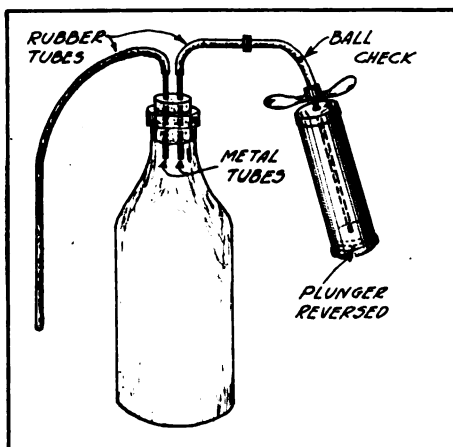
In most six-cylinder automobiles, no provision is made for draining the carbureter or vacuum without removing or disconnecting the heating and feed connections and allowing the fuel in the vacuum tank to run off through the disconnected feed pipe.

All this makes a lot of work and trouble merely to remove the few drops of water or particles of dirt that interfere with the operation of the carbureter.

The little device shown in the illustration will quickly draw all the fuel from the carbureter and vacuum tank without removing anything but the cover of the float chamber.

Two pieces of metal tubing are inserted through a tight fitting cork, fitted into a quart bottle. One tube leads to a common type of small bicycle pump, in which the leather washer on the plunger has been reversed to produce suction instead of pressure.

A B-B shot, or small steel ball, is dropped



Quickly Draws Fuel From Carbureter.

into the short rubber connection between the pump and the bottle, to serve as a check valve.

By removing the screws holding the float chamber cover, the cover can be lifted off. Then the second rubber tube is inserted so that its end will reach the lowest part of the float chamber. Upon operating the pump, the contents of the carbureter and vacuum tank are sucked into the bottle without spilling a drop and any water or particles of dirt that may be present will be brought along.—N. C. K., Okla.

* * *

Removing Valve Slap From Motors.

Valves that are in pairs—such as in the Chandler, Oldsmobile and Reo cars—frequently show considerable noise in the push rod adjustments, which is difficult to remove.

By using a short, stout spring, connect-

ONE DOLLAR EACH

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

ing two of the valves in pairs, it will bring them to a given position and an adjustment can be made which will remove most of the noise.

In many other poppet-valve types of cars, the push rods wear excessively sideways and are not easily replaced with new push rods unless the motor can be taken completely apart. This slapping noise can be very much remedied by rounding off the end of the valve stem to a point, thus making it bear only at one place.

Adjustments can then be made to remove most of the noise in the valves.—G. F. H., N. C.

* * *

For Straightening Connecting-Rod.

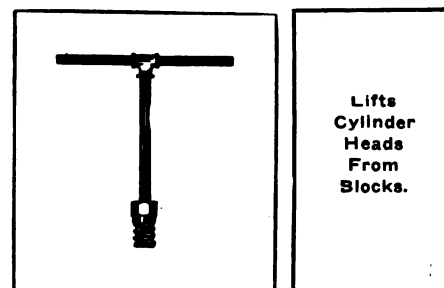
We had occasion to straighten a bent connecting-rod on a Dodge car a few days ago and, by taking the babbit bearing out of the rod and laying the rod on a Dodge front motor support sleeve which was clamped in a vise, we could tell exactly how much the rod was out of line with a square and a steel rule.

The rod was straightened in this way and placed in the motor, and was found to be exactly right.—B. H. S., Tenn.

Tool for Lifting Cylinder Heads.

A useful tool for lifting cylinder heads from blocks may be made from an old spark-plug shell, three short pieces of pipe and a pipe tee.

The pipe should be of a size that will fit the thread of the inside of the shell. A



short length of the pipe is screwed into the shell and the tee placed on the other end. The other two pieces of pipe are threaded on one end and screwed into the tee to form a handle.

If two of these tools are made, they may be screwed into plug holes at opposite ends of the head, facilitating its removal.—L. R. B., Iowa.

* * *

To Carry Extra Bulb.

Ford owners who want to carry an extra bulb will find the following a good way:

Take a bunch of cotton waste and put it in one of the Ford side oil lamps. Put the bulb in there and it will never be broken. As most Ford owners do not use the side lamps, I think it is the best place to carry the extra bulbs for their headlights.—F. H., Wis.

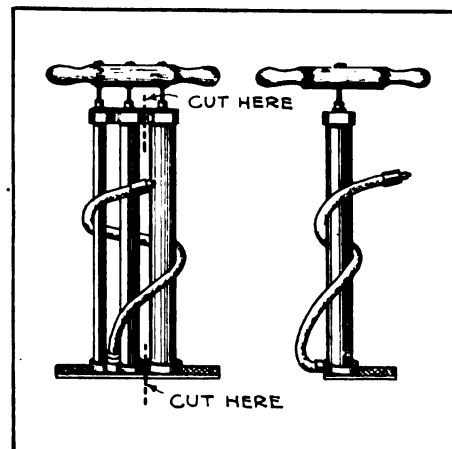
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Repairing Tire Pump.

This is a repair suggestion for a double or a triple tire pump. We all know that either of these is hard to fix and likely not to work well again.

The big cylinder is cut off from the rest, the small hole in the bottom cleaned, and a 1/4-inch tap run in and the rubber air tube connected there.

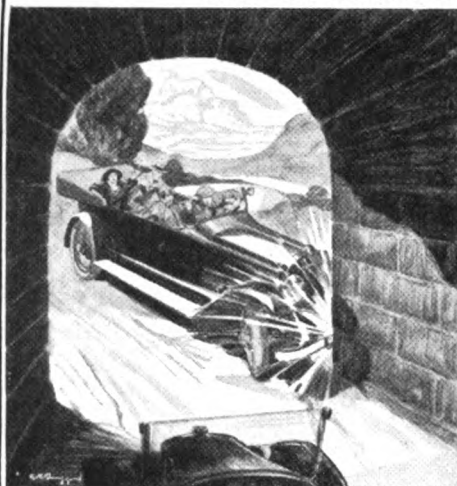
Put the old handle back on it and also put in a new leather. Grind the corners round and paint black.—C. A. M., N. Dak.



Makes Tire Pump "Good as New."



A sharp turn—**CRASH!** But the car wasn't damaged; the **Lyon Spring Bumper** yielded to the blow—and absorbed it.



Lyon Dealers Had 1,800,000 Prospects During 1922

Advantages That Help Sell Lyon Spring Bumpers

- 1 Open "looped-ends" absorb blow in place of passing it on to frame.
- 2 Lyon-patented two-piece overlapping front bar construction gives double thickness of impact surfaces.
- 3 The extraordinary resiliency that is due to the combination of the Lyon-patented construction and the high quality spring steel.
- 4 Ease of attachment. Lyon-patented device makes drilling or alterations unnecessary.

Jobbers: Here is an accessory that's second to none. Write for our proposition.

1923 will probably see even more new cars. To up-and-doing Lyon dealers this will mean that many more Lyon prospects; every car should have bumper protection front and rear.

More Lyon Spring Bumpers are on the job than all the others combined. Considerably over a million have been sold.

Lyon construction is Lyon-patented; Lyon designs are Lyon created.

Lyon construction stands the gaff—Lyon beauty takes the eye.

Start in to-day and make every unprotected car *your* prospect for a pair of Lyon Spring Bumpers. It means profit for you and protection for the owner.

Retail Prices \$10 to \$25

METAL STAMPING CO., Long Island City, N. Y.



Lyon Straight Bar Bumper

LYON RESILIENT BUMPERS

Readers' Questions and Answers

Fan Belt Should Be Tight.

Will it injure the generator on a 1916 Maxwell if the fan belt is so tight that it will not slip at the highest engine speed?—F. H., Wis.

The fan belt of the Maxwell should be tight, and no appreciable slippage should take place.

* * *

Manifold Caused Starting Trouble.

We have a new Ford that starts nicely when cold and runs fine, but is very difficult to start when hot. There is plenty of gasoline in the carburetor and the spark seems to be strong. If the car is left for a while it will start easily again. What could be causing the trouble?—E. G., Iowa.

We know of a similar instance that puzzled a dealer for some time and he finally changed the intake manifolds and eliminated the trouble.

The old manifold was cracked near the engine and evidently opened up when hot, thus admitting too much air.

* * *

Fitting New Body to Reo Chassis.

I have a Reo Serial No. 5538 on which I want to put a body of a later model. I have been unable to get the serial number of the car that the body came from but understand that it was known as a "Texas Oil Field Special."

It has the same motor as the "Reo Speed Wagon," one-man top, gas tank on behind, and as near as I can find out it was put out in 1919 or 1920. It is a five-passenger body, and the body and top are in fine shape.

Could you give me any information as to whether this body will fit my chassis, and as to what will be needed in making the change?—F. B., Tex.

It is impossible to give you definite information, since you do not know the number of the car from which you want to remove the body.

No doubt you can strip your chassis and set the body in place and quickly see the changes that will be necessary. We are of the opinion that no radical or impossible changes will be necessary.

If you can get the number of the body and write to the factory, they can give you definite information.

* * *

Spitting Through Carburetor.

I have a Monroe car, model S-9, 1920. When I speed up to 30 miles per hour, it spits through the carburetor and then gradually slows down.

I recently had the cylinders reground and new pistons put in, but that doesn't stop it. It has good compression and the valves are in good shape. Could you tell me what the trouble can be?—G. B., Mich.

Spitting through the carburetor and slowing down indicates a lack of gasoline. Make sure that there is not a stoppage in the fuel

How? Let Us Tell You!

Ask questions when in doubt.

The more you ask about your —and the more you know, the more money you will make.

Whether you are a dealer, a business, the more you will know salesman, a garageman, a mechanic, a service man or a stock-keeper, your questions will be gladly and promptly answered.

Perhaps there is something you want to know about the mechanism or construction of a car, tractor, truck, or some article of power-farming machinery.

Or you may wish to know how to repair parts, take an inventory or increase the efficiency of your repairshop.

Then there are matters of law, business policy, or organization that may bother you. Get suggestions from us concerning them.

Inquiries about anything or everything are welcomed.

When quick answers are desired, we will send them by mail. Otherwise, answers will be printed in this department. In special cases of urgency, when permission is given us, we will telegraph our answers "collect."

line, or that one of the strainers is not stopped or nearly so because it has not been cleaned recently.

If the trouble is not found here, and a good stream of fuel flows when the line is disconnected at the carburetor, check up the fuel level in the bowl of the carburetor and make sure that the carburetor is clean and in proper adjustment.

* * *

Carbon Under Intake Valve.

What will cause pieces of carbon to stick under the intake valves of a four-cylinder engine and hold the valves open? The engine is four years old and did not give this trouble until after it was overhauled some time ago.—W. L. A., Cal.

A reader has given us his experience in connection with the trouble complained of in this question, which was published in the September issue of the AMERICAN GARAGE & AUTO DEALER. His report is as follows:

"In answer to W. L. A.'s question, in September issue, under 'Carbon Under Intake Valve,' would suggest the trouble is that, when the carbon was scraped out of the combustion chambers, there was some carbon left in some corner or irregularities of the combustion chamber, which jarred

loose when the motor was started and dropped under the valves. A chunk of carbon will very often remain on the seats until taken out and removed by hand.

"Or, possibly, when cleaning out the carbon around the valves, some pieces were left in the intake passage or in the intake manifold, which would be drawn up through the valve and could be caught by the valve as above stated.

"It is very essential, in overhauling a motor, to make sure that every particle of carbon be removed from the combustion chamber, making it as clean, if possible, as when new. Also be certain there are no loose pieces of carbon left under the intake valves or in the intake passages or manifold."

* * *

Maxwell Gear Ratio.

Where can I get a lower ratio gear for a 1916 Maxwell?—F. H., Wis.

In regard to the lower ratio gear for the 1916 Maxwell, we do not know of any firm making a lower gear ratio for a 1916 Maxwell, and a special gear would be expensive.

* * *

Body Polish.

Do you consider equal parts of linseed oil and turpentine a good body polish?—D. L. N., Cal.

Turpentine has a cleaning tendency and boiled linseed oil will have a tendency to close cracks and checks in the varnish.

Such a polish should be applied sparingly and rubbed well with a piece of cheesecloth.

* * *

"Jell" Batteries.

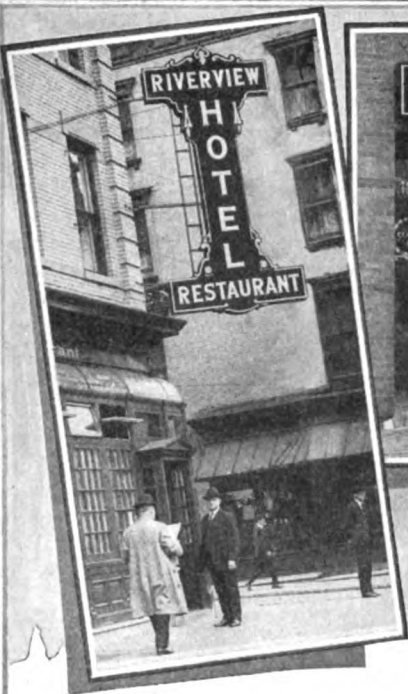
I am coming into contact with jell batteries every day and, not being an expert with them, I would like to get some information about them. How can a jell battery be read to know when it is fully charged?—J. H. S., N. Y.

The voltage or high discharge tests are the ones that will prove most satisfactory in determining the state of charge of a battery with "jell" electrolyte.

On charge, a fully charged cell should show a voltage of 2.5. If you have a high discharge tester, this battery should test similar to any other battery.

There seems to be a number of batteries with "jell" electrolyte this year, especially radio batteries. When used for radio, they do not slop.

The "jell" is composed of sulphuric acid and water glass—sodium silicate—or, in some instances, potassium silicate. This jell can be drained out, or rather cleaned out, and replaced with sulphuric acid if it becomes unsatisfactory.



FLEXLUME SIGNS

FOR more than ten years, the Flexlume Corporation has been learning how to make electric signs draw business.

There is more to it than glass and metal—design, for instance, the art of making the sign carry advertising thought. There is the science of proper illumination, the right kind of construction and the importance of having a nation-wide service organization. All these points have been perfected by Flexlume in ten years of specializing on a particular type of sign.

Let us send you a sketch showing a Flexlume for your business.

FLEXLUME CORPORATION

25 Kail Street

BUFFALO, N. Y.



Dealers!

Here is the marvelous

Hot Draft Auto Heater

Everybody with unheated garages wants one. Operation costs 1/3 less than that of electric iron. List price—\$15.00.

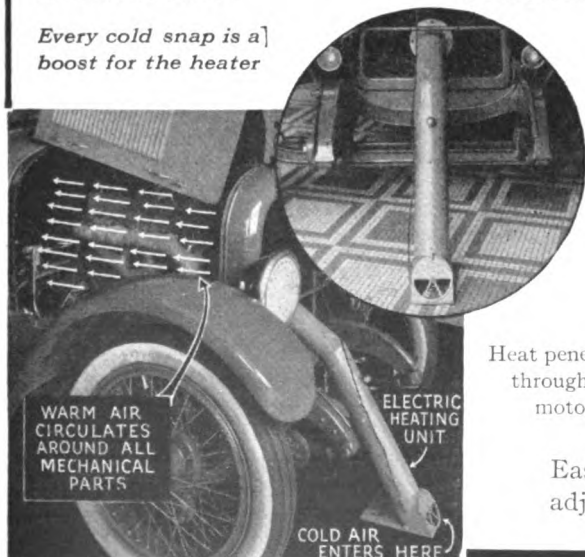
Write now for attractive discounts and proposition.

Electric Draft Heater Corporation

719 Fulton Street

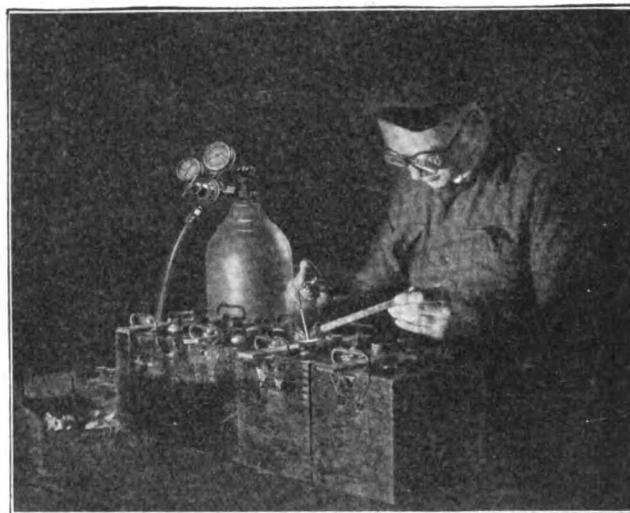
Chicago, Illinois

*Every cold snap is a
boost for the heater*



Easy to adjust.

Battery repairing



is very profitable with a Rego
"Little Six" Outfit on the job



It's the small complete outfit that makes big profits on welding—cutting—brazing—lead and carbon burning—also radiator repairing.

You need this money maker. Write for our catalog and prices.

THE BASTIAN-BLESSING CO.

135 West Austin Ave.

CHICAGO, ILL

Deciding the Current Used.

Is there a quick method of telling whether direct or alternating current is being used in an electric lamp?—M. L., Tenn.

If a magnet is brought near the bulb when lighted, the filament will vibrate if alternating current is used, but if direct current is used the filament will be deflected to one side slightly as the magnet nears the bulb and will not move until the magnet is withdrawn.

* * *

Installing Camshaft Gear.

Please tell me the proper way to install a new camshaft gear in a 1915 Hudson, model 6-40. The old gear has nearly all the teeth stripped.—F. D. G., N. Y.

We would suggest that you use both a new camshaft gear and the one it meshes with on the crankshaft, as they are both worn somewhat and are apt to be noisy and short-lived if but one is replaced.

The new gears will probably be marked, but, if not, mark them carefully from the old gears before they are removed.

Probably the gears can be pulled with a gear puller if the radiator and gear cover are removed.

* * *

Rebabbiting Ford Connecting-Rod.

Please tell me how to rebabbit a Ford connecting-rod, and what to use instead of clay.—F. H., Wis.

There are several jigs on the market for rebabbiting Ford connecting-rods that can be bought so cheaply that one cannot afford to try the operation without one.

The surfaces of the jig which will come in contact with the babbitt should be smoked, preferably with an acetylene torch, so that the babbitt will not be cooled suddenly and not allowed to flow into a smooth casting.

The rod should be carefully tinned before the operation is started, so the metal will be securely fastened to the rod. Both the rod and the jig should be heated before the metal is poured.

Only a special babbitt metal, such as can be obtained from any jobber, should be used. The detailed procedure is slightly different with the various molds but the operation is comparatively simple.

* * *

Crankshaft May Cause Knock.

Being a subscriber to your magazine and getting much information from its pages from month to month, I am asking you to help me solve some of my problems.

I have a Studebaker six, 7-passenger, that is about five years old. It has a very bad knock that I cannot locate.

The knock is a heavy one, sounding much like a main bearing knock, but I have taken up both the mains and the connecting-rods and they are all fitting snugly. This knock can be heard when motor is idle and when under a load; also whether running 15 or 25 miles per hour—all the same but much intensified at the 25 miles per hour speed.

There are two possible chances of locating

Now It's Your Turn.

In answering these queries concerning the difficulties arising in garage work, we have given the generally approved methods.

But we realize that many of our readers will have a different way of "doing the trick," and can offer interesting and helpful suggestions from a different angle. So we would like to have you tell us whenever you have a different method for handling these various questions.

Let's make this a Round Table for the exchange of ideas and thus be mutually helpful!

this knock of which I know: The camshaft may be sprung or one of the rods may be warped. The pistons fit rather loosely but should not make the heavy knock, and I cannot believe that they are causing the trouble.

The owner says that he has had this car three years and it has always had the knock; that he has had several different mechanics try to locate the trouble, which hasn't been found as yet.

The flywheel is tight, the timing gears have little play (lash), and the motor sets solid in the chassis. The noise seems to be in the front half of the motor.

Are Studebaker pistons of special design? That is, do they have the wrist pins on the exact center, or are they off center as in the Buick? If so, how can one tell if the pistons are correctly placed?

I have a similar trouble in a Ford, but am almost certain that it is caused by a "cocked rod."

The engine does not labor or heat up when running idle or under load. A new distributor drive pinion has been installed, but spark checks correct according to engine principles.

How may rods be tested when one does not have a gage to line them up?

What would be the result if one placed a 13-plate battery in a Ford instead of the regular 11-plate now used? I have a 13-plate Willard that I wish to install in a Ford if no harm will be done.—B. W., Ill.

We are sorry that you did not give us the model and engine number of your car so that we could go into the details of its construction and be able to point out the weak points in this particular type of engine.

To the best of our knowledge, the Studebaker cars have never been equipped with pistons with offset piston pins.

A fairly accurate method of testing connecting-rods can be had by removing the cylinder block and setting a square on the upper surface of the crankcase and against the sides of the pistons at the center of the pins.

A slight taper may be noticed as the top of the piston is often smaller than the bottom, but if this taper is the same on both sides, the rod is straight. If the wear on the cylinder or piston seems to be in a spiral direction, it indicates a sprung rod. However, as this is a delicate job, why not get

the services of an expert who has a testing device and save time and be sure of results?

If the pistons have more than 0.006 or 0.007 clearance, they should be renewed. If cylinder walls are more than one or two thousandths out of true, they should be refinished.

If all bearings are tight and correctly fitted, it is probable that your trouble is due to a sprung crankshaft, or possibly to a sprung camshaft. The crankshaft can be checked by placing on centers on a lathe. Check all bearings for roundness and also for running true. Here again you are confronted with a delicate job and an expert might be of much service.

The 13-plate battery will be all right in the Ford. You may have to have the charging rate set up a bit to keep it charged. An oversized battery is a good investment.

* * *

"Butting Valves."

While I was in France, during the world war, I was sent to the First Army Air Service shops, in Neufchateau. I failed as an airplane motor mechanic because I could not answer the question: "What do we mean by butting valves?" Will you please let me know what the answer to this question is?—F. D. G., N. Y.

There is no such term in S. A. E. nomenclature as "butting valves," nor have we ever heard of the term.

Possibly you mean buffing valves, which means polishing them on a buffing wheel. There is a butterfly valve, such as is used as a throttle valve in most carbureters.

We put your question up to a member of our staff who taught airplane engines to pilots for eight months and had all the information from Washington that was sent to schools, and he informs us that he never heard of this term.

* * *

Effect of Heating Manifold.

Does heating the intake manifold increase or decrease the power of an automobile? What effect has it on fuel economy?—D. V. L., N. Y.

Yes and no. If a good grade of fuel is used and it is being properly vaporized without heating the manifold, the heating would reduce the power, as it would expand the gases and consequently a less charge would be taken into the cylinder.

Slightly higher compression can be used with a cool mixture than a hot one, and this means more power.

From an economy standpoint, the mixture should be as hot as can be used without lowering the compression, as it increases the thermal efficiency.

In practice, it is usually necessary to heat the mixture in some manner to get it vaporized, and more power and economy is obtained by proper vaporization than by trying to burn half-vaporized fuel. It is a case of a slight evil preventing a greater one.

LEATHER

Automotive Products



Our "Junior" and "Senior" Fan Belt Racks are especially popular and profitable for dealers everywhere (see illustration of "Senior" Rack at left). Our complete line also includes—

Group Fan Belts
Wetproof Flat Fan Belting
Vee-Flex, Vee-Sol and
V-Lug Roll Fan Belting
Tough-Tan Leather V-Belts
Leathertex and Wetproof
Cone Clutch Facings
Universal Joint Discs
Anti-Squeak Lacing

Sold by leading dealers everywhere. Ask your jobber for full information or write today for our complete catalog and discounts.

HIDE, LEATHER & BELTING CO.

Pioneer Manufacturers of Leather Automotive Products Since 1870.

DETROIT
EVANSVILLE

INDIANAPOLIS

MEMPHIS
NEW YORK

THE PISTON YOU HAVE HOPED FOR The BU-NITE Steel Band Piston

A Thermostatically controlled piston, safeguarding the running condition of an engine.



You will want to add the piston the automobile trade has been demanding.

Write Us for Details

BUTLER MANUFACTURING COMPANY

Established 1897

3234 W. Washington

INDIANAPOLIS, IND.

STERLING CRANKS

FOR ALL CARS

STERLING PRODUCTS

are
Guaranteed
with a full sense of responsibility behind the guarantee

Sterling Products have secured wide distribution and a strong position in their market in a remarkably short time. There are two reasons:

They fill a genuine need—they meet a ready-made demand.

Their high quality is backed by this unreserved guarantee:

We fully guarantee Sterling Products against defects in material and workmanship. We will replace free of charge any Sterling Product which fails due to such defect.

Sterling Products Corporation.



Sterling Starting Cranks for all cars. A small assortment enables the dealer to fit any car.

Sterling Tankaps for all gasoline tanks. With only eleven types, any car can be fitted.



Sterling Piston Rings The only piston rings giving a wall-pressure which is both light and perfectly uniform.

Every Sterling Product is priced to sell readily and to yield the dealer a large profit, on a really small investment.



Check the memo, pin it to your letterhead or card, and mail it. And don't wait—do it now.

STERLING PRODUCTS CORPORATION

2938 N. Market St.

5 St. Louis, Mo.

Memo

Send full information about Sterling Products. I am a jobber () dealer () salesman ().

To STERLING PRODUCTS CORPORATION

2938 N. Market St., St. Louis, Mo.

STERLING TANKAPS

FOR ALL CARS

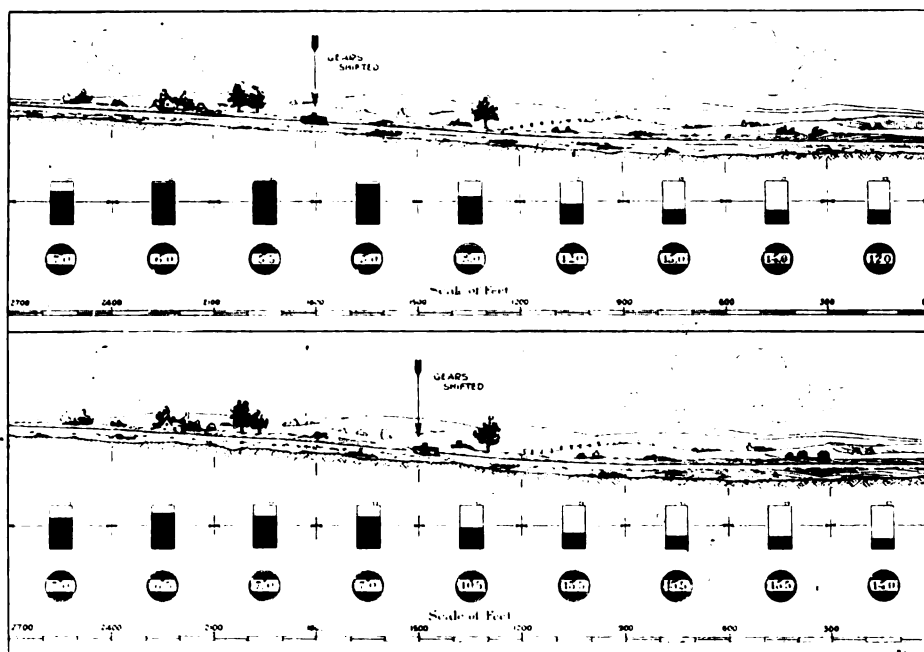
U. S. Bureau of Public Roads Offers Pointers on Saving Gasolene.

Here is a suggestion to motorists for the saving of gasolene, which may be small in amount for a single day's drive but which will be worth while in a year's driving. The common practice of waiting to shift gears on hills until the car has almost come to a stop is one of the causes of waste of small amounts of gasolene. According to the Bureau of Public Roads, this fact is shown by tests conducted by Prof. T. R. Agg, of Iowa State College, in co-operation with the bureau under the auspices of the National Research Council.

The tests were made primarily to discover the effect of various kinds of highway surfacing material and different grades on gasolene consumption. The conclusion with reference to faulty driving is merely incidental to the tests.

The vehicles used in the tests were equipped with an ingenious device which makes a continuous record of the gasolene consumed as the vehicle moves over the road, and another which makes a simultaneous record of the speed at every instant. Suitable sections of road were selected for the tests and the exact grades of these sections were determined.

The specially equipped vehicles—both trucks and automobiles—were then driven over the various sections taking the records of the gasolene consumption and speed with the two instruments described. Several trips were made over each section, and the rates of fuel consumption and speed for each trip were plotted on a graph with the profile or grade of the road.



These Diagrams Show Effect of Delayed Gear Shifting on Hills.

Exact instructions for the most economic driving will vary with the make of the car or truck, but the following pointers will be of value to all motorists:

In ascending a hill, don't wait until the last second to shift to a lower gear. If you do, you will not only lose speed and overtax your engine but you will also consume more gasolene.

The chart illustrated shows the result of two trips of a one-ton truck. On one trip the gears were shifted at a speed of

ten miles an hour and on the other at a speed of five miles an hour. The rate of gasolene consumption is indicated by the size of the cams, which represent the amount of fuel used in each section of 300 feet, and the speedometers show the variation in speed. Together they show very clearly the economy of the early shift.

In the two trips over the same stretch of road with a truck having a total weight of a little over four tons, the average speed was approximately the same in both cases.

Accessories—Dealers' Key to Profits

Here's Another Good Way to Increase Your Sales.

It doesn't matter whether your business is large or small, a good coupon book system is certain to prove a worth-while and profitable investment.

Coupon books afford a simple, safe and sure way to eliminate a large amount of costly bookkeeping, credit extensions, errors, disputes, time waste and handling of cash.

When you make a monthly statement to a customer, all you have to do is to list the number of coupon books you have sold to him. There cannot be any dispute about individual charges, because the customer knows he accepted the books and there is no chance for argument because he sees the correct amount, in coupons, detached at the time each purchase is made.

When all the coupons are used, he knows that their full value has been received. Besides this, there is no chance of omitting from the state-

ment charges which you may have overlooked making when giving service during a rush of business.

From the customer's viewpoint, the coupon book is an unfailing source of convenience and satisfaction. He recognizes and appreciates the elimination of delays in looking for ready cash, writing checks, and waiting to sign charge slips.

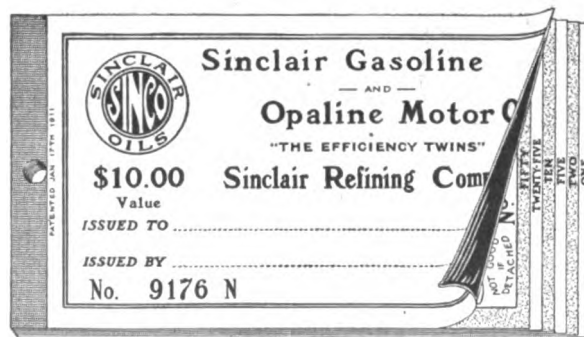
Further, when a car owner has a coupon book in his pocket that is good for gaso-

lene and supplies, he would rather go a few blocks out of his way to have it redeemed than to stop and pay cash for supplies—your customer, having one of your books, good only at your service station, will be of the same opinion. Thus he becomes a permanent customer and your sales are increased.

The Rand McNally patented, self-indicating and strip-form coupon books are prepared in an especially convenient form, including several different types and for amounts from \$10 to \$25.

One style of book which is greatly favored is similar to the railroad mileage strips, combined with a straight coupon book.

The 5-cent coupon values on the right-hand side of the strip are indicated by figures from 5 cents to \$9.50—in a \$10 book. On the left-hand, the figures are reversed, beginning with the \$10 amount, showing the total value of the unused coupons remaining in the book. The owner and



A Coupon Book Is Always Convenient.

BIG NEW PROFITS FOR EVERY DEALER AND GARAGEMAN IN Pioneer Shackle Bolts



Here is a **complete** line of **quality** replacement spring and shackle bolts. Our wonderful **new list** gives specifications for every popular make of car; and we pack our bolts in standard assortments (shown above), standard packages or bulk shipments. YOU can "cash in" with this line! Write for complete information.

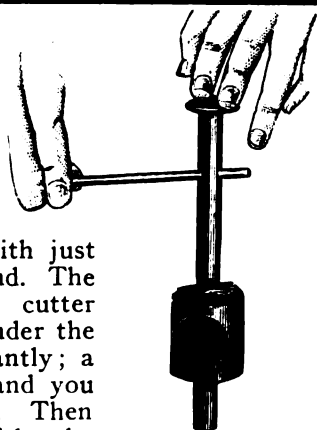
The Continental Auto Parts Co.
88 Grand St., Columbus, Ind.

Reseat heat-scaled valve seats

quickly, accurately—with just the pressure of one hand. The remarkable "Skinner" cutter (not a reamer) gets under the worst heat scale instantly; a few easy revolutions and you have a glass-like seat. Then reface the valves with the "Skinner" refacer, and valve grinding will take only a few moments.

The set includes five cutters— $1\frac{1}{16}$ " to $3\frac{1}{8}$ " and refacer taking all valves. Write for free treatise on valve work.

M. B. SKINNER CO.
560 Washington Boul., Chicago



SKINNER

MOTOR VALVE SETS

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Save Money By Making Your Own Boots and Reliners

Just because a tire is too far gone to be worth vulcanizing is no reason why it can't be made good for at least another 500 miles by cementing in a boot or reliner.

You earn a double profit when you make your own boots and reliners because you save money on their cost and make money on jobs that would be unprofitable if you had to buy the materials.

Junk casings provide excellent material for boots and reliners and the operation of beveling the four sides of the boot down to feather edges so there will be no shoulders into which the tube can become pinched can be done easily, quickly and economically if your shop is equipped with a

JUMBO FABRIC SKIVER

This machine is constructed to cut any desired width of skive on any number of plies of fabric or cord material.

It makes an easy task out of something that it is impossible to do by hand.

Our illustrated booklet, "A Story of Patches," shows the ease and efficiency with which this machine operates. It gives complete and simple directions for removing beads, removing treads, cutting to size and beveling, or "skiving," the four edges of patches.

This book will be very valuable to YOU in YOUR business. **Send** for it.

P. S. M. Co.

3116-36 Snelling Avenue
MINNEAPOLIS, MINN.

Mail This Coupon Today

P. S. M. Co., 3116-36 Snelling Ave., Minneapolis, Minn.

Please send me without obligation a copy of your booklet "A Story of Patches" and catalog of your Tire Repairing Equipment.

Name

Address

the seller as well knows at any time how much is left. Thus, you can remind the customer that he needs a new book. Then there are "1 cent" coupons, to the value of 50 cents, to complete the book, making it easy to make change.

Coupon books can be sold on credit or for cash, either by solicitors or at your station. Each holder of a coupon book, upon buying gasoline, oil, grease, supplies, repairs, etc., presents his coupon book to the attendant and coupons to the amount of his purchase are detached.

If desired, it is easy to keep an individual record of the coupons taken in for each book, the general method being to have an envelope with the customer's name and the number of the book written near the top, in which the coupons collected may be kept. The envelope can then be filed away according to the name or the number of the book.

All desire for misappropriation of collected coupons is entirely removed from

wise—and cannot again be presented for redemption.

Finally, it is to be remembered that these coupon books will very effectively advertise your business and your goods, so that you have an efficient little "silent salesman" working for you all the time.

Samples, prices and detailed information will be promptly forwarded to those requesting them by Rand McNally & Co., 536 S. Clark St., Chicago.

Accessory Manufacturer Puts Out Valuable Trade Book.

"To sell more, tell 'em more," might well be the motto of the Advance Automobile Accessories Corp., as evidenced by a "Data Book" that has just been issued by them for distribution to jobbers, jobbers' salesmen and a limited number of preferred dealers.

The book is both a presentation of the advertising plans of the company for the coming year and a text-book for the trade. It tells how the company is going to get back of its own products and gives the reader the kind of information and selling talk that can be used to good advantage in talking to the consumer, or the dealer, as the case may be.

The very advertisements that are shown in the books, as examples of what the firm is doing, are packed with selling information. These are supplemented with a clear presentation of the advertising policy of the company, views of the plants in which the various articles of the line are produced, and the selling helps which are supplied to the jobber and dealer.

The book also contains a variety of useful information—such as resale prices and discounts, shipping weights and cuts for jobbers' catalog. In short, the book is a real "Data Book," and is supplied in the same size as the standard letterhead, so that it slips into the data files of the jobber or, by perforating the sheets, into the loose-leaf catalogs of the jobbers' salesmen.

Any dealer who would like a copy of the book can secure it by addressing the Chicago office of the Advance Automobile Accessories Co., Dept. 1350, 1721 Prairie Ave., on his business stationery.

Vellumoid Stops Connection Leaks and Gives the Perfect Job.

Good work, at fair prices—that is the combination which is giving the automotive repairman satisfied customers and better business.

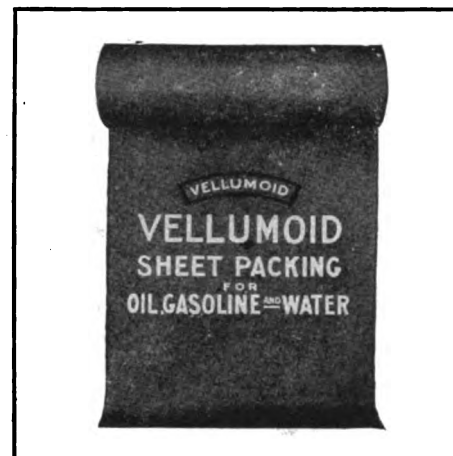
But even though the workmanship elsewhere may be of the highest order, if there are leaks in the oil, gasoline and water connections, there is bound to be dissatisfaction.

There is now on the market a one-purpose sheet packing, known as "Vellumoid," which is declared to be exceptionally effective in eliminating leaks in oil, gasoline and water connections.

Vellumoid consists of a strong fiber,

chemically treated, making it oil, gasoline, water and air-proof. It is very compressible, thus insuring a tight joint, and its toughness prevents tearing or breaking of gaskets.

It is further claimed that this packing



Vellumoid Will Not Deteriorate.

will not deteriorate—that oils, gasoline and water merely increase its strength.

Gaskets are readily fashioned, as Vellumoid is easily cut with a knife. No shellac is required.

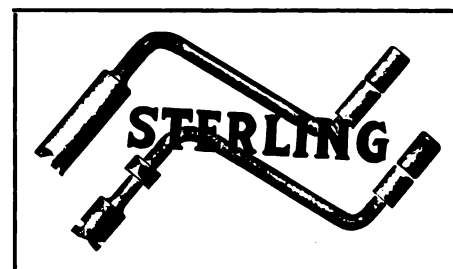
The price, by the square yard, is so reasonable that it makes the cost of a gasket gratifyingly small.

The manufacturer, the Fibre Finishing Co., 73 Tremont St., Boston, Mass., will gladly send you samples for testing if you will write making such request.

Some Sterling Products of Interest to Up-to-the-Minute Dealers.

That the old-fashioned starting crank, familiarly known as the "Armstrong Starter," is far from being a back number, is proved by the experience of the Sterling Products Corp., 2938 N. Market St., St. Louis, Mo. In the past six months this company has opened over 1,000 retail accounts on their line of Sterling starting cranks, of which some 56 types offer a crank to fit any car made.

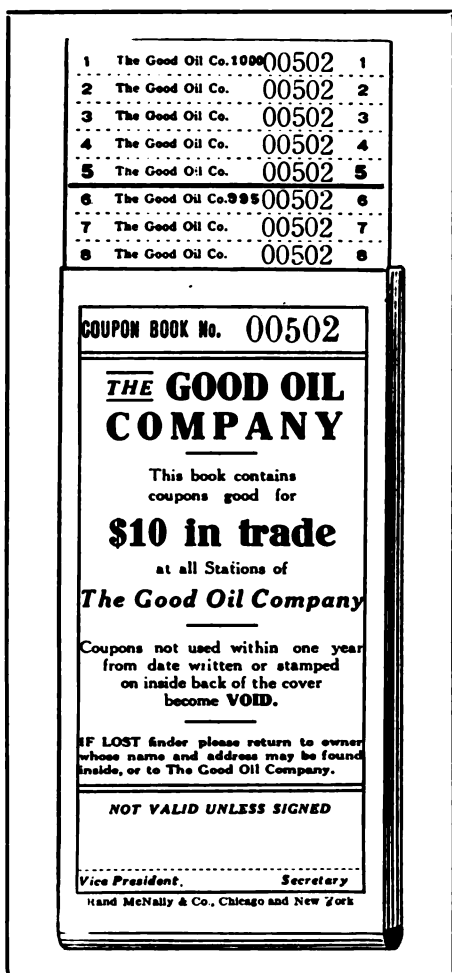
Sterling cranks offer no new or startling



Sterling Tankaps for Fuel Tanks.

features except their ready market. Their chief selling point seems to be the advantage of a small and inexpensive stock, from which any car owner can be served without the delay incident to the ordering of a crank from the car distributor or factory.

A new Sterling product will be marketed in the next two weeks, under the name of



Coupon Books Effective Advertisements.

your employes or outsiders, on account of the vertical perforation feature. The perforation of each strip of coupons vertically through the center permits separation of those redeemed when first received in the auditor's office. The part containing the number and amount is used only for accounting purposes—it is worthless other-

Ask 'Em to Buy a ROSE TIRE PUMP

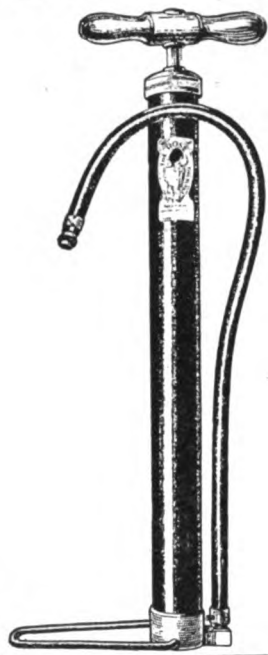
And when you ask 'em to buy tell 'em about the Rose patented valve and 5-year guarantee—You'll sell 'em.

The valve makes easy pumping. It takes the suction load from the up-stroke and prevents loss of air on the down-stroke.

Most Rose pumps will last many times five years. They are built of the best material with careful workmanship.

Ask 'em to buy.

Frank Rose Mfg. Co.
HASTINGS, NEBR.



**THE FRISZ
WHEEL
& GEAR
PULLER
NEVER
SLIPS**



*Made in
FOUR SIZES
to take care
of all size
gears and
wheels*

Don't Waste Time and Lose Money

fussing with a wheel puller that grips poorly and slips.

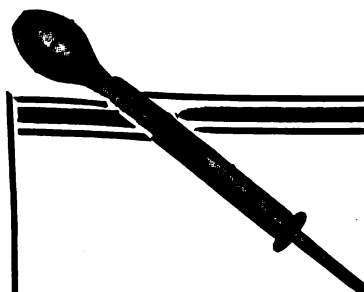
Get the Frisz Wheel and Gear Puller. Its massive gripping fingers hold like a ship's anchor. They never slip and their grip is equally automatic, whether expanding or contracting. The drop forged, high carbon, nickel steel arms are always parallel with the power screw. This means a pull always in a straight pull—an easy pull.

Free from complicated parts. Needs no special attachments. Made of finest materials; heavily reinforced where stresses come heaviest.

Get the Frisz Wheel and Gear Puller from your jobber—today.

JOBBER—Write for our interesting proposition.

FRISZ MFG. CO.
1019 N. Capital Ave. Indianapolis, Ind.



IF

*It's Known by Millions—
Needed Daily by Millions—
And Costs a Nominal Price*

Can You Sell It?

That, in a nut-shell, describes the conditions affecting the sale of the good Hafner Hydrometer. Millions know it—need it—want it—and can afford to pay the nominal price it costs.



**Told to Auto and Radio Owners in
The Saturday Evening Post**

Two-and-a-quarter millions of automobile owners and radio "bugs" are being told the interesting Hafner Hydrometer story by means of our dominant advertising in *The Saturday Evening Post*. This costs us thousands of dollars—we are doing it for the motor-car accessory business in the belief that there is a big and growing market for a better and a less expensive hydrometer.

New dealers by the hundreds are now pushing Hafner Hydrometers. Attractive window-cards, pamphlets, folders, displays, etc., help you sell them fast. The low price of only 75c means that no one can afford to take chances with his battery. And the Hafner Hydrometer is good—good as any and better than most.

HAFNER MANUFACTURING CO.
3128 Carroll Avenue CHICAGO, ILL.

MAIL THIS COUPON NOW

It will bring you interesting profit facts. Cut it out—fill it in and mail it now—TODAY!

HAFNER MANUFACTURING CO., (2)
3128 Carroll Avenue, Chicago, Ill.
Please tell me why I should sell Hafner Hydrometers and why I am sure to sell them in quantity and at real profit per sale.

NAME

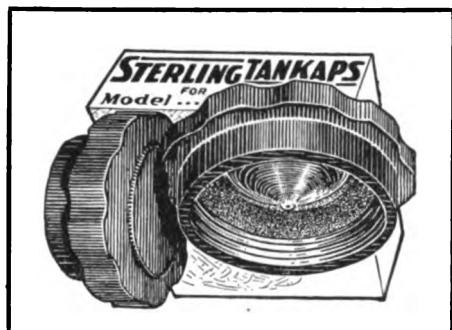
STREET

TOWN

STATE

Sterling Tankaps—replacement caps for car and truck fuel tanks. With an assortment of 12 types of Tankaps, the dealer can fit the tank of any car or truck.

An investigation reveals that a surprising



Sterling Tankaps Find Ready Market.

number of gas tank caps are lost every day, largely through the carelessness of drivers or filling-station employees. The car-owner who drives away from the pump without his gas-tank cap is a ready customer for the dealer with an assortment of Sterling Tankaps.

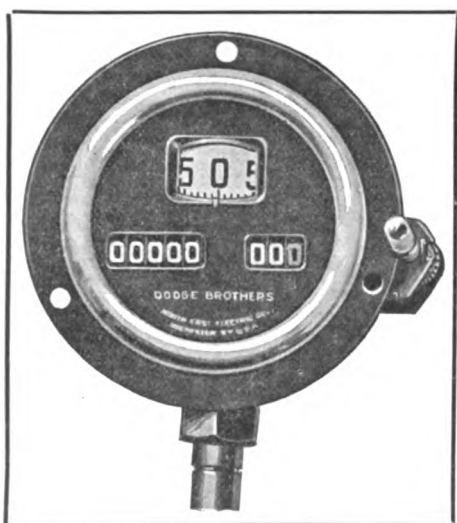
Sterling Tankaps are machined from a light but unbreakable white metal alloy, finished in dull black, accurately threaded, and fitted with a gas-proof cork gasket.

Meet the New North East Speedometer—It's a Winner!

The North East Electric Co. has now added a speedometer to its line of automotive equipment. This new instrument is built of the same ruggedness and durability that characterize all other North East products.

The North West speedometer is of the magnetic type. The distinctive features are:

1. High degree of accuracy which is



North East Speedometer Rugged and Durable.

maintained indefinitely because of the permanence of magnetic flux density of the magnet.

2. Special provision for eliminating the

effect of temperature changes upon the accuracy of the readings.

3. Moderate speed at which the moving parts are driven, which minimize wear and vibration.

4. General ruggedness and simplicity of construction, making the instrument easy to service.

5. Good size and readability of all indicating and registering figures.

6. Convenience of resetting trip mileage.

7. Attractiveness of appearance and finish. The instrument is finished in flat black, with a polished nickel bevel effectively setting off the face. The face has a special oxidized finish which, it is stated, is absolutely permanent.

Briefly, the mechanical construction is as follows:

The scale cup is mounted in a bracket which is dowelled onto the top of the main frame of the instrument.

The shaft which carries the rotating magnet has a worm cut in it to engage with the ring gear which drives the odometer.

This ring gear engages internally, through a planet pinion, with a pair of sun pinions, one of which is held stationary and the other drives the odometer shaft. The revolving pinion has two less teeth than the stationary pinion—hence this arrangement gives a further reduction of speed at which the odometer is driven.

The odometer shaft engages through back gearing with a clutch that drives the tenths mileage ring of the trip odometer. The trip odometer reads 99.9 miles before returning to zero.

On the season odometer side, the shaft carries a cam which revolves inside a special-drive gear so as to give it an eccentric motion which effects an additional 10 to 1 reduction in the speed of the unit mileage ring of the season odometer. The season odometer reads 99,999 miles before returning to zero. The odometer rings drive each other through a succession of transfer pinions, arranged so that it requires a complete revolution of a ring to advance the next one 1/10 of a revolution.

The entire odometer is built up as a detachable assembly, which can be readily lifted from the frame and taken apart for inspection without disturbing any of the rest of the speedometer mechanism.

Oiling of the instrument is taken care of by felt oiling wicks resting against the magnet shaft, one above the odometer and the other below. An additional wick is provided in the back-drive type of instrument to oil the horizontal drive-shaft. These wicks hold sufficient oil to last at least a year without requiring attention.

These instruments are being built in two styles—one for attachment of the shaft at the bottom, and the other at the back.

The drive-shaft used is of the multi-coil type and is extra heavy.

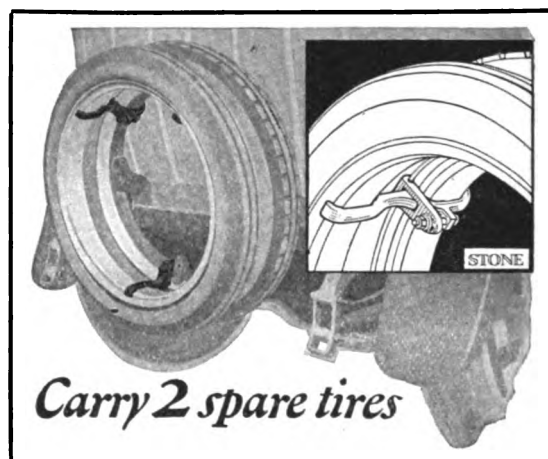
North East speedometers have already been adopted as standard on Dodge Brothers and Reo cars.

Do You Want to Sell More Rims? Then Read This.

After all, there are such a lot of ways to increase shop profits. Here's one that you may perhaps not have heard about before.

The Stone Mfg. Co., of Chicago and New York, is offering a new utility—which is Stone-guaranteed—in the form of an extra spare tire carrier, that affords a practical and logical method for carrying two or more spare tires and is said to be 100 per cent efficient in performance.

This device is very easy to apply or remove, and consists of three members which are clamped to the "regular" spare rim. These members automatically lock the extra spare so securely in place that it cannot become dislodged by jolting and bumping.



Stone Extra Spare Rim Carrier Fits Any Car.

Two or more extra spares can be carried with the aid of a set of Stone extra spare rim carriers for each spare. The carriers automatically tighten the extra spare while you adjust them to the first spare while you adjust them and it is impossible for the extra spare to be loose.

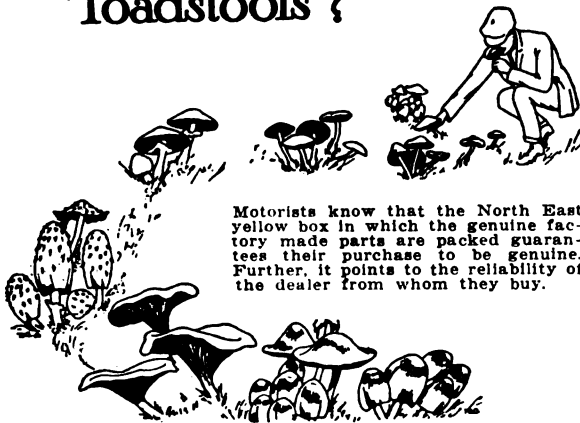
A Stone extra spare rim carrier fits any car using the popular type of demountable split rim, and makes a neat appearance as well as giving an added sense of security.

This product sells at an attractive price to jobber, dealer and motorist. Write The Stone Mfg. Co., 1502 So. Michigan Ave., Chicago, for full particulars.

Method of Measuring Storage Battery Electrolyte Impurities.

An investigation has been undertaken by the U. S. Bureau of Standards to establish, if possible, a speedy and accurate method for the measurement of the effect of impurities in storage battery electrolytes. Methods which have previously been used require considerable time, and accurate and consistent results are difficult to obtain with them.

Mushrooms or Toadstools?



Motorists know that the North East yellow box in which the genuine factory made parts are packed guarantees their purchase to be genuine. Further, it points to the reliability of the dealer from whom they buy.

Genuine North East Service Parts are distributed to the trade by

NORTH EAST SERVICE INC.

Atlanta
Chicago
Detroit
Kansas City
New York

Rochester
San Francisco
Windsor
London
Paris

Official Service for
North East Electric Co.

Rochester, N. Y.

Manufacturers of

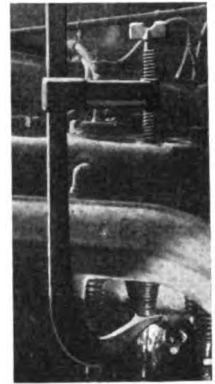
Starters Generators Ignition Horns
Speedometers



The Mertz Valve Spring Release

for the
Mechanic Who Cares

Thoroughly practical. Sliding arm automatically locks at any desired point on vertical bar, leaving operator's hands free to remove or insert key or pin in valve stem. Body of cold drawn steel. Arm of malleable iron.

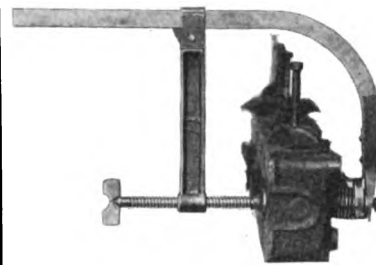


Four sizes—No. 2 for T-Head Motors and overhead-valve motors; No. 4—V-type motors, Fords and other small motors; No. 9 for large trucks, tractors and passenger car motors having large manifolds; No. 7 for all motors using valve-in-side.

NET PRICES

| | |
|-------|--------|
| No. 3 | \$2.80 |
| No. 4 | 2.80 |
| No. 7 | 2.80 |
| No. 9 | 4.00 |

Tools supplied through your jobber. Send us his name.

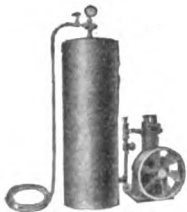


The Rosier-Howard Corporation
307 National
Hutchinson, Kansas

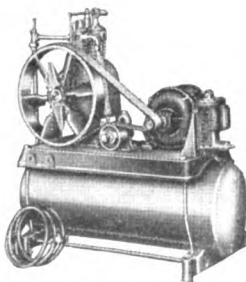


AIR COMPRESSORS—HOISTS—TROLLEYS—CRANES

Established 1854



Style "S"
Single-Stage Outfit
Belted only—five sizes, $\frac{1}{4}$ to 3 h. p. complete, less driving power.



Style "V"
Two-Stage Outfit
Sizes $\frac{1}{4}$ to 2 h. p. Furnished with automatic starter. A. C. or D. C. motor.

"An Original Design"

YOU can purchase a Curtis Outfit with all the confidence that goes with a well-known thoroughly established and reliable product. Sixty-nine years of experience, over twenty-six of which have been devoted to the manufacture of air compressors, have enabled Curtis engineers to develop an entirely original design based on sound engineering principles.

First and Only Two-Stage Air Compressor With a Copper Intercooler

Curtis Single-Stage Compressors have controlled splash oiling system—no excess oil to rot tubes. Big saving in oil. Fan flywheel aids in keeping cylinder cool; increases capacity. Hand unloader prevents blowing fuses and jumping belt, and many other exclusive features. Several styles and sizes.

Curtis Two-Stage Compressors have all features of the single stage. Exclusive aeroplane-type copper intercooler assures fullest advantage of two-stage compression. They are perfectly balanced so that the crankshaft bears a uniform load—this assures less vibration and wear. Several styles and capacities. For full information use coupon, or a postal will do.

Curtis Pneumatic Machinery Co.
1515 Kienlen Avenue, St. Louis, Mo.

Branch Office: 530-U Hudson Terminal
New York City

Canadian Representative: Joseph St. Mars
Winnipeg and Toronto, Canada

CURTIS *Single and Two Stage*
Air Compressors

Send
Coupon

Curtis
Pneumatic
Machinery Co.

Gentlemen:
Please send me descriptive
folder and full particulars on
Curtis Air Compressors.

Name.....

Address.....

Jobber's Name.....

Address.....

Up-to-the-Minute Garage Equipment

Are You Equipped to Get Your Share of Air Profits?

Garagemen nowadays recognize that air service attracts customers but, in order to do this, it must be air service that is quick, clean and reliable—and that is just what Brunner equipment assures.

At every stage of its construction a Brunner compressor is given the sort of in-

turned and grooved on a special piston-turning machine, and then are ground to the same close manufacturing limits as the cylinders.

All other parts entering into the construction of Brunner compressors are made with equal care and precision.

No matter what your air needs may be, there is a Brunner outfit that will meet them.

One type, which meets all the requirements of the average automotive establishment, is the Brunner model 932. While a garage that operates pneumatic shop tools will require greater air capacity and an oil station that has air-operated gasoline pumps must have a heavier machine, this type satisfies the needs of a great majority of dealers.

Model 932 is equipped with a No. 92 power plant, which is a belted outfit, silent and foolproof. This power plant is not only silent but is equipped with every modern appliance to render it almost self-operating. The capacity is ample for a tank of 49 to 50 gallons capacity.

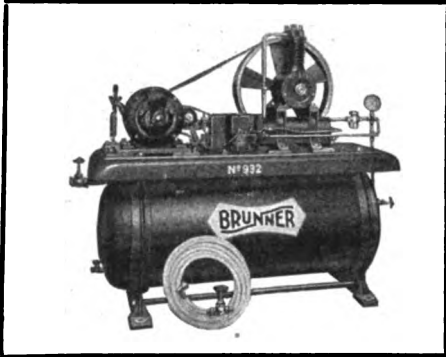
The spring-governed, adjustable belt-tightener is designed to make belt slippage impossible.

Two important functions, with only one moving part, are combined in the unloader-controller. This device automatically handles motor stopping and starting, and it may be adjusted to maintain any tank pressure from 150 to 200 pounds. At any setting, the motor starts 40 pounds below the maximum for which the controller is set.

This same mechanism empties the air

and a gage registers tank pressure. A Brunner patented check valve retains the air in the tank, and two safety valves are built into the compressor. Rigid feet are provided to facilitate the mounting of the outfit on shelf or floor.

The power plant is securely bolted and locked to matched, solid arch saddles, and held in position with lateral braces. A double-tested Brunner tank, guaranteed for



Model 932 Is Equipped With No. 92 Power Plant.

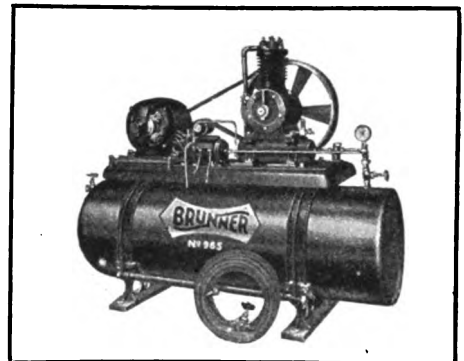
spection and testing, by competent engineers, that makes the finished product the marvel of efficiency that it is.

For instance, the smoother the finish of two running surfaces, the less will be the friction and the longer will the original fit be preserved. Cylinders used in the construction of Brunner compressors are not only ground on the latest type of Heald cylinder grinders to plug gage, but pistons and all other running parts are ground.

No Brunner compressor is ever placed in production until the company's engineers have designed, and its tool department has delivered to the tool crib, a complete set of special tools—jigs, fixtures and gages, one for each operation to be performed. As a result of this standardization, economical and accurate production is secured and all parts of the same stock number are exactly alike within the closest possible manufacturing limits. If a replacement part is ever needed, the Brunner user appreciates this standardization.

All materials for use in Brunner compressors are carefully selected, particular attention being given to their durability. All bronze, steel, bearing metal, etc., used is of S. A. E. specifications. In cylinders, a special alloy fine gray iron casting is used. This iron is not easily scored and is not porous. All cylinders are aged before final machining, and the slow-wearing qualities of this iron permits regrinding several times thus adding greatly to the life of the compressor.

To ensure perfect accuracy and duplication, every Brunner cylinder is machined in a boring fixture. And Brunner pistons are



Brunner Model 965 Is a Heavy Duty Assembly.

a working air pressure of 175 pounds to the square inch, is suspended in the saddles and secured in place with strong metal straps.

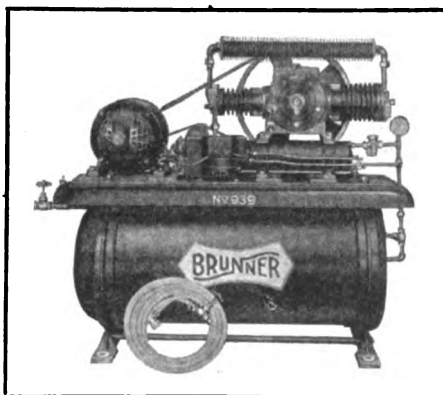
This unit operates without vibration or noise, will not develop loose joints, and is good for 20 years of daily operation.

Another unit is the Brunner model 965, which is a heavy duty assembly. It is free from vibration, the No. 105 compressor being of balanced load type, with all running surfaces ground and polished. The operation of this giant type outfit is said to be as smooth and silent as an 8-cylinder motor. Years of constant operation will not affect the rigid stability of this rugged and reliable outfit.

This unit has ample capacity for the largest and busiest filling station, even handling three or four air-driven gasoline pumps. Pneumatic truck tires are quickly inflated from the large tank.

While space is not wasted and the whole assembly is very compact, the entire unit is not small. The top of the compressor reaches 48½ inches from the floor. The length over all is 65 inches and the extreme width is 22 inches. The weight, 775 pounds, is too great for overhead location.

Still another interesting unit is found in the Brunner model 939, which is an exceptionally fast working ¾-horsepower unit, pressure in the 32-gallon tank rising from zero to 175 pounds in less than 25 minutes. A pressure rise of 25 pounds is a matter of five minutes or less. An astonishing efficiency is produced by dual valves, large inter-cooler and snugly fitted, polished pistons.



Model 939 Is An Exceptionally Fast Working Unit.

chamber below the compressor when the motor stops. Later, when the controller "cuts in" and the outfit starts up, the air is first delivered to the empty chamber and thus the motor starts "no load." The only attention needed by this machine is the regular oiling and tank drainage.

A fan-blade pulley cools the compressor,



Fig. 1

The Major Is the Tool for Ford Trucks

The Major was designed particularly for heavy, stiff Kelsey rims, but it's readily adaptable to other stiff and heavy rims, too.

Adjustable jaws clamp it to the rim as shown in Fig. 1. After it is fastened securely in position by means of thumb nuts on jaws, the rim is separated by turning the turnbuckle nut.

Just pull rocker arm forward depressing rim on opposite side of joint and break joint by a straight inward pull. Then draw turnbuckle closer together causing one end of rim to slide past the other end, until it has been collapsed. Tire casing can then be easily removed from the rim. (Fig. 2.)

As the Major springs rim around nearly its entire circumference, there's no buckling whatsoever.

Of course, you want a Major for your garage. Tell your customers, too, particularly those who have Ford trucks. They'll appreciate the ease with which it is operated—for the Major is a "masterpiece"—and its price is "right."

Write for those prices—now.

WEST TIRE SETTER CO.

255 Mill St.

Rochester, N. Y.



Fig. 2



The KESTER core contains superior flux



We're just passing the "good word" around—so you can make those soldering jobs as PERFECT as you want them to be!

Use the coupon below and you'll be glad!

Chicago Solder Co.
4210 Wrightwood Ave.
Chicago, Ill.

FREE SAMPLE COUPON

CHICAGO SOLDER CO.
4210 Wrightwood Ave., Chicago,

Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder

Name

Company

Address

City State.....

Our Supply House is.....

Am. Garage

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

The Brunner Mfg. Co., Utica, N. Y., which manufactures these compressors maintains a staff of engineers and a laboratory for working out air problems and advising with customers. There are Brunner branches and Brunner factory men all over the country, ready to aid customers in selecting suitable models and maintaining the outfits already installed.

Ask for a copy of their booklet illustrating Brunner equipment and giving methods for making air compressor equipment profitable. A request directed to the address given will bring it to you.

The "Major" Is the Tool for Those Ford Trucks.

When you have tire casings to remove from Ford truck rims, you will find an exceedingly efficient and time-saving tool in the "Major" tool for Ford trucks which is made by the West Tire Setter Co., of 255 Mill St., Rochester, N. Y.

This tool was designed especially for use on the heavy, stiff Kelsey rims used on Ford trucks, but is readily adaptable to other rims of a similar character, as will be seen from the illustrations.

It is provided with adjustable jaws for clamping to the rim, and is placed in position as shown in Fig. 1.

After it has been securely fastened into position by means of the thumb nuts on the jaws, the rim is separated by turning the turnbuckle nut, the first action of which is to pull the rocker arm forward, depressing the rim on the opposite side of the joint and breaking the joint by a straight inward pull. The turnbuckle is then drawn closer together, causing one end of the rim to slide past the other end until it has been sufficiently collapsed to allow the tire casing to be easily removed from the rim, as shown in Fig. 2.

All that is necessary in order to put the rim back and lock it in position is simply to reverse the action of the turnbuckle.

For ordinary rims, the turnbuckle may be turned by the hands, but for very stiff rims,

where more power is required, a flat piece of steel which is about 10 or 12 inches in length, may be passed through the opening of the turnbuckle nut and used as a lever.

The "Major" tool springs the rim around nearly its entire circumference, and conse-

within the shaft. Water is carried through a brass tube in the very center of the spindle, and the construction is such that it is impossible for any oil to reach the grinding surface.

Out-of-round grinding becomes a virtual impossibility, it is declared, through the simple adjustment features of the eccentric housing, which revolves about its axis with a planetary motion.

Linking the name of the company with the name of the machine is an act of wisdom on the part of the Micro people. It is easier to remember one name than two—a fact which has been recognized in the naming of many modern manufacturing concerns. It is the simplest way to make the public remember both names, or, as the Micro people would say, "The Ultimate Way."

New Method of Relining Brakes Is Proving Successful.

The new Multibestos method of relining external brakes was first introduced early in March, 1922, by the Multibestos Co., Walpole, Mass. Since that time, a large number of "New Method" stations have been established in various parts of the country.

Special equipment is required to reline brakes in 90 minutes or less. The equipment, which is very complete, includes seven anvil rings, an assortment of split rivets, a straight rivet holder, an offset rivet holder, a riveting hammer, a cold chisel, punches and wire cleaning brush.

The company is continually producing sales literature of an attractive, constructive and really helpful nature and which,

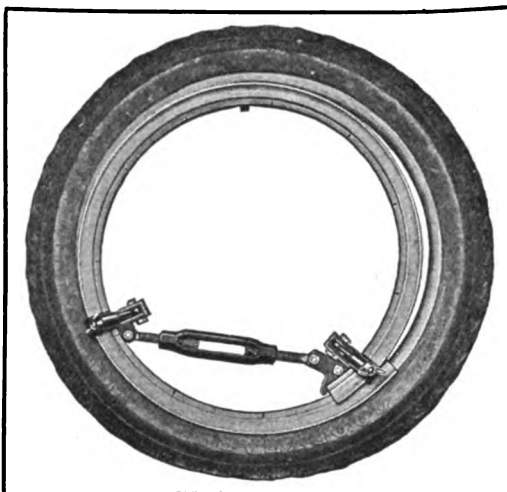


Fig. 2. Tire Casing Easily Removed.

quently does not have the tendency to buckle or kink the rim.

This is a wonderfully successful tool on many types of interlocking rims, but it will be especially appreciated by Ford truck owners.

Details regarding prices, etc., will be promptly forwarded to those interested who will write the manufacturer, the West Tire Setter Co., at 255 Mill St., Rochester, N. Y.

B. L. Schmidt Co.'s Firm Name Now "The Micro Machine Co."

To those who have learned to associate the name "Micro" with wet internal grinding, it will be a matter of interest that the manufacturers of the Micro machine have changed their name from "The B. L. Schmidt Co." to "The Micro Machine Co.", have moved into a fine new factory building, and are centering their attention exclusively on the manufacture of the Micro machine.

Whatever progress has been made in the science of wet internal grinding is said to be due in a very large measure to the exhaustive research of this Davenport corporation. An extensive publicity campaign has been used to acquaint the motoring public with the advantages of cylinder refinishing by the wet method, which leaves the lining of the combustion chamber so satin-smooth that no "breaking in" process is necessary.

Among the outstanding features of the Micro machine are the spindle and housing. The three-section spindle of chrome vanadium steel is designed to eliminate all vibration—a result brought out largely by the six sets of bearings contained



Fig. 1. Major Tool Placed in Position.



Multibestos Brake Re-Lining Equipment.

when sent out by the dealer, can help to secure the much to be desired results; namely, more brake relining jobs for the shop.

The Multibestos film, "Tell 'Em," has been found to be a most effective means of telling the Multibestos story to jobbers, dealers and garagemen.

DON'T LEAVE 'EM KID YOU, GEORGE—

PISTONS DO NOT HAVE TO BE *"BLED"
TO STOP OIL PUMPING. WE EXPLODED
THIS POPULAR THEORY IN DEVELOPING



**Scientific term applied to drilling of pistons.*

In installing "Kendell's" you have no motor changes whatsoever to make, no deepening of ring grooves, drilling of pistons, oil regulations, changing of tappet clearances or certain brands or grades of lubrication and fuel to adhere to. Install two "Kendell's" on the lower grooves of each piston and your oil worries are over with. If you are still doubtful, write or wire us today and we will gladly forward you complete details.

KENDELL ENGINEERING CORPORATION
FORT WAYNE, INDIANA

Do you, Mr. Dealer, want to get more timer customers?

Read what one of our Texas distributors has to say about the new

**FRM
TIMER**

Dear Sirs:

Your F R M Timer received. It is not necessary to wait 30 days to remit, I am satisfied—please send me two more at once.

Yesterday I picked up a Ford owner in my car. He had ridden with me before. We drove a little ways when he asked, "What have you done to this car?" I told him of the F R M and his reply was, "See how quick you can get me one."

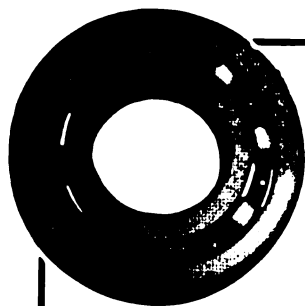
Hereafter I will sell only the F R M.
W. N. N., Texas.

Our dealer's proposition is a good one.

Retail Price \$3.50

FRM Mfg. Co.

Fairbury, Illinois
Dept. B

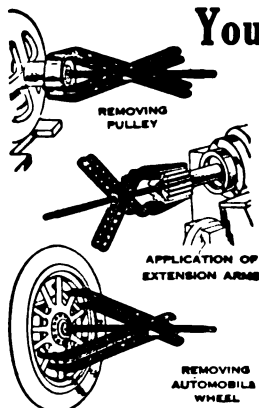
**WESTERN GUARANTEED REBUILT BEARINGS**

You can save 50% on replacement bearings by sending the old ones to us for rebuilding. Our rebuilt bearings are equal in all respects to new ones—they are fully guaranteed.

We will replace any used bearing you have with a Western guaranteed rebuilt—or, if beyond repair, will sell you a new or rebuilt bearing at a great reduction in price.

We are headquarters for rebuilt bearings, new ball and roller bearings, and steel balls—all makes.

WESTERN BEARINGS CO., 2837 S. State Street, CHICAGO, ILLINOIS

You Need One or Both These Gear and Wheel Pullers**The "LITTLE GIANT"**

pulls any gear, wheel or pulley—anywhere—in a jiffy. Built on the only correct principle—produces maximum efficiency with minimum effort. Can't twist off or let go. Made of best grade drop forge steel. Adjustable up to 13" diameter. Price complete with extension arms \$12. Satisfaction guaranteed or money refunded. Order one today or write for data.

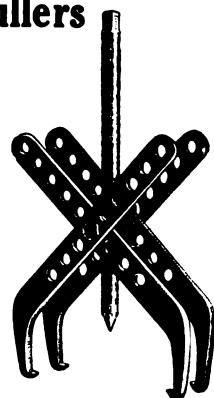
"THE HARDER THE PULL—THE TIGHTER THE GRIP"

Write for dealers' discounts and literature

Premier Electric Co., 3802 Ravenswood Ave., Chicago

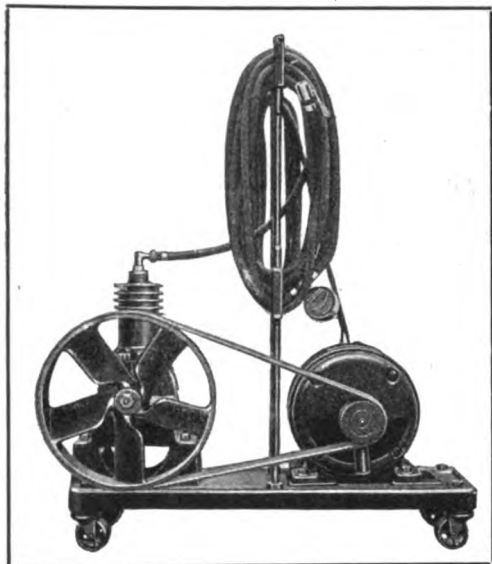
"BIG BUSTER"

This heavy duty puller is designed to cover a range of work upward from where the "LITTLE GIANT" and other tools leave off. Weighs 100 lbs.—open adjustment 40". Pulls heavy motor truck and car wheels, ship and aeroplane propellers, heavy fly and gear wheels, transmissions, etc., easily. Can't slip off work—no arm locks required. Price complete with wrench and handle, \$50. Where you have a job no other puller will touch you need a "Big Buster."



Rapid and Efficient Air Service Assured With Kellogg Compressors.

As pioneers in the manufacture of power-driven passenger car and truck tire pumps, the Kellogg Mfg. Co. has rightly gained an enviable reputation. This has been due to



A Kellogg Compressor, Suitable for Private Garage and Small Filling Station.

the merits of the product, and the same is true of Kellogg air compressors.

Among the distinctive features to be noted in the Kellogg compressors is the lubrication system. The large oil reservoir insures efficient lubrication for long periods, whether the oil in the reservoir is high or low. Thus it is not necessary to constantly replenish the supply and the trouble caused by burnt bearings is avoided, as well as scored pistons and cylinders and loss of trade through lack of air supply.

Vanadium steel, heat-treated, hardened and ground, has been used in the construction of the Kellogg valves, which are of disk type and extremely simple and efficient. Both intake and outlet are built into the removable cylinder head, this construction being designed to remove any pos-

switch, automatically discharges the trapped liquid from the filter chamber, and also allows the use of the filter chamber as a retort in starting. The motor always starts against zero pressure, thereby removing all possibilities of burnt motors due to starting against a full load.

While Kellogg compressors are built to meet all requirements, the following models will be of particular interest.

Model EM 201 is a compressor that is suitable for private garage and small filling station use. It can be supplied stationary or on casters, and pumps direct without storage tank. It is surprisingly rapid for its size and the air it pumps is just as oil-free as that from the larger models.

Oil from the pump is carried up by the gears into an oil well over the main crankshaft bearing. An oil lead from this well carries a continuous flow of oil to the main bearing and also throws oil onto the connecting rod bearing.

A wick from a felt pad at the lower end of the cylinder extends into this oil well and thus lubricates the cylinder and pistons.

Model EM 251 is designed for heavy duty, medium capacity. This is a single-cylinder compressor, either portable or stationary. It has an air displacement of $2\frac{1}{2}$ cubic feet per minute, and a $2\frac{1}{4}$ -inch bore with 2-inch stroke.

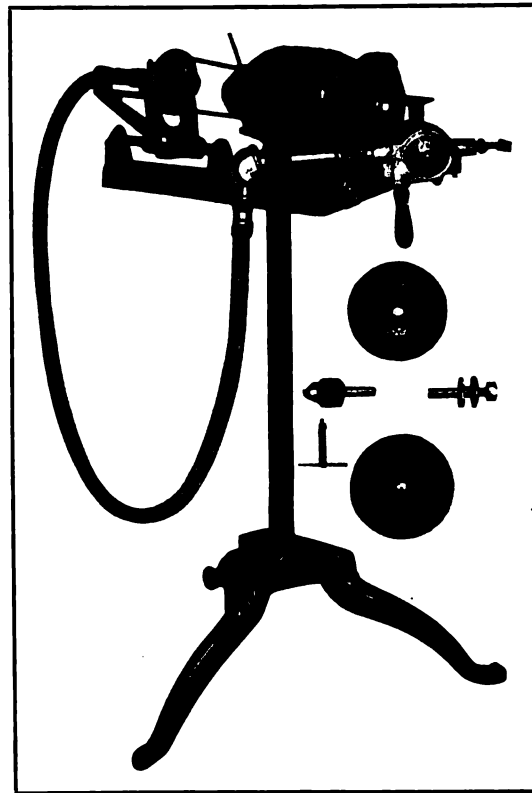
Both portable and stationary models are tank equipped, and both include the Kellogg patented construction for insuring oilless air. Equipment includes safety valve, automatic air control, motor, fan blades on pulley to cool pump fins, cord construction hose, and all other necessary parts for heavy duty service.

A third type is designed as model EM 52, and is intended for heavy duty and large capacity. This is a two-cylinder compressor, with an air displacement of $4\frac{1}{4}$ cubic feet per minute, a $2\frac{1}{4}$ -inch bore and 2-inch stroke. This model can be supplied with tank, which is recommended for large garages, and is tested to 400 pounds pressure. Equipment includes safety valve, automatic air control, belt tightener, fan blades on pump pulley to cool pump fins, 30-foot hose cord construction, and all other necessary parts for heavy duty service.

It can also be furnished without tank, which is recommended for large gasoline filling stations because of lower initial cost

and reduced operating expenses. This is a direct pumping outfit, with approximately the same tire filling speed as any tank outfit, and can be equipped with from one to four air lines. It is operated by an automatic telephone switch at the service point. The motor starts when the hose is removed from the switch and stops when the hose is replaced.

An attractive steel "free-air" sign is sent



Sioux Flexible Shaft and Attachments, No. 802.

to garages and filling stations with every Kellogg compressor outfit.

Further details may be had upon request from Kellogg Mfg. Co., Rochester, N. Y.

A Profit-Making Garage Tool Which Has Many Uses.

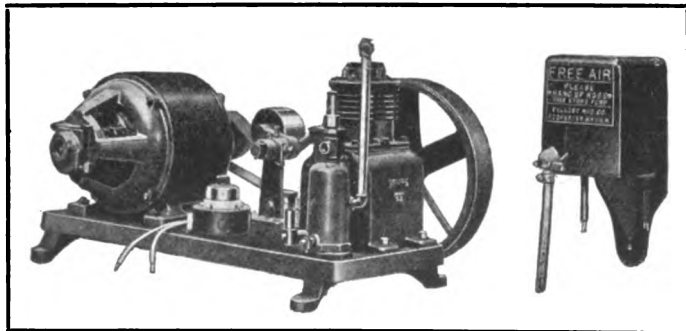
Under the title, "Bigger Shop Profits and How to Get Them," an exceedingly attractive catalog is being issued by Albertson & Co., widely known manufacturers of Sioux tools and originators of the popular "Sioux Service."

Among the interesting and worth-while tools that are described in this booklet is the Sioux flexible shaft and attachments, designated as No. 802.

This is a tool for which unlimited uses can be found in every shop. It is particularly handy when making repairs that require getting under the car or working in cramped quarters.

For valve grinding a three-speed pulley provides the correct speed—low for large valves, and higher for the smaller valves. A control enables you to stop and start at will, the tool being used.

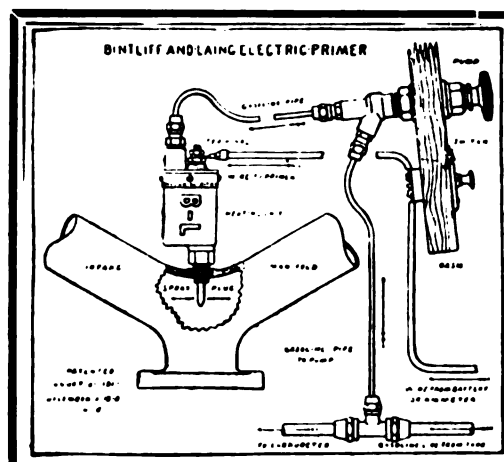
When there is emery wheel grinding to be done, the emery wheel can be taken to the work, and makes it possible to get at



Kellogg Unit, Direct Pumping, Designed for Heavy Duty.

sibility of the valves injuring the pump by falling into the cylinder.

Another important feature is the air filter between the compressor and the tank, which prevents moistures from entering the tank or tires. A pressure release valve, which is a part of the automatic control



"B&L" HOT GAS PETROLIZER

Electrically Heated

Will convert the incoming gasoline from liquid to a hot vapor which will start your car in the coldest weather. Can be applied on any make of automobile.

Price \$12.00, with complete fittings

Satisfaction Guaranteed or Money Refunded

AUTO DISTRIBUTING COMPANY

410-416 Sycamore Street

Plainfield, N. J.

JAFFE the NATIONALLY ADVERTISED QUALITY RADIATOR for FORDS



Our \$100.00 reward guarantee against freezing damage, together with our nation-wide reputation for quality and up-to-the-minute service mean easy sales for you. Our large dealer's profit per sale means larger returns to you. Write us. We have something to tell you that means more money to you.

JAFFE RADIATOR COMPANY

741-D West Van Buren St.

Chicago, Ill.

"I always have good business" says
the garageman who uses

National Guaranteed Coupon Books

"Customers like them—they're so convenient—no stopping to make change. They like the discount made for cash, too.

There's no bookkeeping for me. I get my money in advance. No more disputes with customers." Try National Coupon Books in your establishment, and watch the motorists "hit the trail" to you.

Samples will interest you.

NATIONAL CHECKING COMPANY

271 Chestnut St.

St. Paul, Minn.

Battery Repair Men! Automotive Electrical Stations!

Suppose a specialist were to enter your shop and help you select instantly the right battery, magneto or ignition part necessary to handle every job;

—and he also showed you the most economical way to buy Battery and Electrical testing and repair equipment: the kind that insures quick and skillful results;

—and his wealth of information included every tool and Replacement part that finds its way into a modern battery or electrical service station like yours;

—would you like to have his services—FREE?

Our new 138 page catalog is just such an expert—a helper that points a finger to the exact solution of every equipment or parts problem.

A copy will be forwarded on request, FREE—WRITE NOW!

W. F. PRICE BATTERY SUPPLY CO., Inc.
3300 N. Broad Street. Philadelphia, Penna.



For every automotive need

Repairmen from near and far have found it worth while to order their gears from us because they are always able to get what they want when they want it. We furnish promptly transmission, differential or silent-timing gears. The quality of Ganschow Gears is almost proverbial.

Feel free to consult our engineering department.

Let Us Quote You

WM. GANSCHOW COMPANY

1002 Washington Boulevard
Chicago, Illinois



It's the General Favorite —This Blublaze Timer

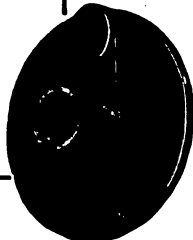
Horse Shoe, New York.
October 19th, 1922.
Blublaze Motor Specialties
Corp.,
45 Seventh Avenue,
Long Island City, N. Y.
Gentlemen:
It gives us pleasure to
state after using your
Timers on our Fords for
two years, that we have
practically eliminated Tim-
mer trouble, which is, of
course, about 80%
of Ford troubles.

Yours very truly,

(Signed)

HORSE SHOE FOR-
ESTRY COMPANY.

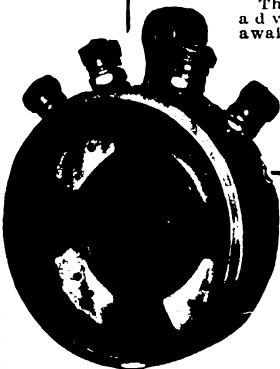
Below—
The sim-
ple rotor,
showing
copper-
carbon
brush.



10 Market Street,
Marletta, Pa.
November 29th, 1922.
Blublaze Motor Specialties
Corp.,
45 Seventh Avenue,
Long Island City.

Dear Sirs:
I have used your BLU-
BLAZE TIMER on my
Ford and have driven over
12,000 miles without the
least trouble of any kind,
while before this, I had to
get a new timer about ev-
ery six weeks. It surely is
the greatest timer for a
Ford that I have ever seen.
The only trouble is that we
cannot get any around this
section as I am about the
only user about here that
is using your timer. Your
timer not only is oil and
water proof, but delivers
more spark than any other
timer I have ever used. I
am sure I could sell quite
a few, and am taking the
liberty of asking you for
prices in different sized lots
and also a given territory.
Thanking you in
advance and
awaiting your an-
swer,

Yours truly,
(Signed)
JOHN A.
STULTZ.



The Con-
densite
shell,
showing
polished
raceway
and con-
tacts.

The BLUBLAZE TIMER is moulded of
Condensite (or Bakelite), which is one
of the world's best known insulators.
Overhead terminals keep the wires from
becoming greasy and oil soaked. Contact
is made through a special composition
brush of copper, carbon and graphite,
which is wiped with even pressure over
the highly polished raceway in the Timer
Shell. The composition of the brush is
designed to eliminate pitting. Brush gives
thousands of miles of service and is quick-
ly replaceable at trifling cost.
Sliding contact gives automatic freeing of
the brush from oil and dirt and insures hot
spark at all speeds and under all condi-
tions. The BLUBLAZE TIMER requires
no oiling.

LIST PRICE

In the East.....\$3.00
In the West.....\$3.50

Dealers, write for fine proposition.

**BLUBLAZE MOTOR SPE-
CIALTIES CORPORATION**
Department D

Factory: 43 Seventh Ave.,
Long Island City, N. Y.

the inaccessible places. It is especially con-
venient in welding work, for smoothing out
welds.

Drilling, reaming and polishing work is
quickly and easily handled with a Sioux
flexible shaft and attachment.

The roller bearing feature of the Sioux
flexible shaft is particularly to be noted.
This is designed to add life and power,
through the elimination of friction in the
 housings.

This feature is the result of careful study
and considerable experiment, under actual
working conditions. These roller bearings
are placed on the flexible shaft at points
about six inches apart, so that when the
shaft is bent or curved during use it does
not at any time come into contact with the
housing.

The shaft itself is made of high-grade
music wire, one winding on top the other.
The first winding is of small wire, and is
followed by larger sizes. Each size is
wound in the opposite direction to the pre-
ceding wire, so as to make the shaft
compact.

Another special feature of the Sioux
flexible shaft is the 6-inch emery wheel,
which is permanently attached to the motor,
for use in grinding tools and other small
parts. A guard and rest are also included
in the equipment.

Sioux flexible shaft and attachments No.
802 A. C. includes: A ¼-horsepower motor;
stand complete; flexible shaft with univer-
sal joint and spindle control; three-speed
drive pulley and belt; one 6-inch emery
wheel; one 4-inch emery wheel and arbor;
one 4-inch wire brush and arbor; one ¼-inch
capacity Jacobs chuck, including arbor; and
one No. 500 grinder attachment.

Write Albertson & Co., Sioux City,
Iowa, for further particulars concerning
this and other items of the very complete
line of shop equipment which this company
manufactures.

Hot Draft Auto Heater Takes Heat Right to Heart of Works.

Winter is here—and with the advent of
the cold weather there will come, for many
car owners, the usual annoyances due to the
cold, such as starting troubles, frozen radi-
ators, etc. That is, they may have these dif-
ficulties to contend with if they have not
had the forethought to forestall them by
using Electric Hot Draft Auto Heaters.

The "Electric Hot Draft Heater" has been
designed by its manufacturer, the Electric
Draft Heater Corp., 719 Fulton St., Chi-
cago, for the purpose of keeping the
"works" of the car thoroughly warmed, thus
obviating the nuisances of balky motors,
frozen radiators and water jackets, stiff oil-
congealed motors, as well as saving wear
and tear of the motor and transmission and
keeping the battery at the proper tem-
perature.

As it draws only four amperes, it is ex-
ceedingly economical, considering the re-
sults. The heating element used is excep-

tionally efficient, forcing three cubic feet
of hot air per second through the top out-
let at a temperature of approximately 250
degrees Fahrenheit.

One of the important features of this
heater is the adjustable cold air inlet—the
draft—at the lower end of the device. By
regulating the amount of cold air which
passes over and through the heating element
on the inside of the pipe, a uniform outlet
of hot air is assured at the top without the
use of motor or fan.

This permits an even and constant flow of
hot air to pass through the radiator and
over and around the engine and all other
mechanical parts under the hood. This hot
air remains constant, it is stated, regardless
of the outside temperature, never varying
even on the coldest nights.

Further claims are: That lubrication will
always be soft; there can be no cracking of
enamel on the outside of the car because the
heat is all inside the hood; enough heat
penetrates through the floor-boards to make
a closed car warm and comfortable in the
morning; there is no fire hazard; no odors
or fumes; and it uses one-third less current
than an electric flat iron.

An "Electric Hot Draft Auto Heater" is
very simple of operation. To set it going,
it is only necessary to attach it to the light-
ing socket and turn on the current. It is
adapted to the ordinary city lighting circuit
of 110 volts.

While this device is not intended as a
garage heater, there is always sufficient sur-
plus hot air to take the edge off the cold
in the garage after thoroughly warming all
the essential motor parts under the hood.

If It Is a Tough Job, Let the "Big Buster" Handle It.

If you have a pulling job that is more
than usually hard to handle, then you'll find
a reliable and efficient helper in the "Big
Buster" gear and wheel puller. It is espe-
cially valuable when pulling motor truck
and tractor wheels, boat and airplane pro-
pellers, heavy flywheels, gearwheels and
pinions, transmissions, drivewheels, etc.

This is a heavy duty tool which is de-
signed to cover a range of work upward
from where the "Little Giant" and other
tools leave off. It works and acts like the
"Little Giant" puller, except that it weighs
100 pounds and has an open adjustment to
40 inches. A direct pulling power of 50
tons is easily obtainable, it is said.

The "Big Buster" cannot spread, turn or
slip off the work, and no arm locks are
required. It can be relied upon to stand up
to the toughest kind of pulling jobs. There
are no time-wasting adjustments to be made
and only a few moments are required for
setting the tool to pull the necessary job.

The "Little Giant" is often called "Big
Buster's little brother." It is designed to
handle all ordinary jobs of gear pulling,
wheels, bearings, pulleys, etc. It is quickly
adjustable up to 13 inches for outside or



PRIME WITH HEAT

Cars start hard in cold weather because they are cold. Therefore the heat principal is correct.

POMEROY PATENTED ELECTRIC GASAFIER

\$5 COMPLETE FOR ALL CARS

has proved for four years in United States and Canada that it starts cars as easily in winter as in summer. It will outlast any car. A trial carton will convince you, Mr. Dealer.

Our References: Any Rochester, New York jobber.

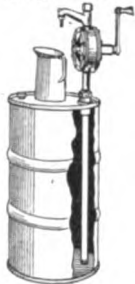
POMEROY ELECTRIC CO., Inc.

Manufacturers

40 E. MAIN STREET

ROCHESTER, NEW YORK

Pump direct from the shipping barrel.



Attached to barrel in less than five minutes.

BATTLE DOUBLE ACTING TWO WAY PUMP

CAPACITY FROM ONE PINT TO TEN GALLONS PER MINUTE

A PUMP that meets the wants of the GARAGEMAN and SERVICE STATION and sells to the trade using GASOLINE, KEROSENE, Light or Heavy OILS. Serves small quantities, Has VOLUME to transfer a barrel of fluid in ten minutes. Barrel is LEAK PROOF when pump is attached. Can be placed at the curb where exposed to the weather. FARMERS can pump their GASOLINE direct from the shipping barrel to the tanks of their machines, saving TIME, WASTE, LABOR and cost of STORAGE TANKS. Pumps either to or from the barrel or tank. Write Today for Dealers' Discount, No limit to prospects. Pumps sold on trial.

Address Dept. 7.

MECHANICAL DEVICES CO., Mfrs.

Contains no Leather or

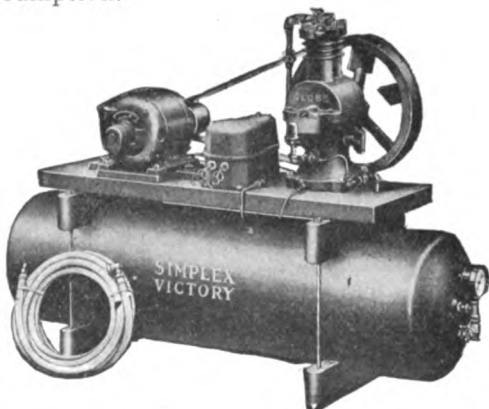


Composition Valves

Aurora, Illinois

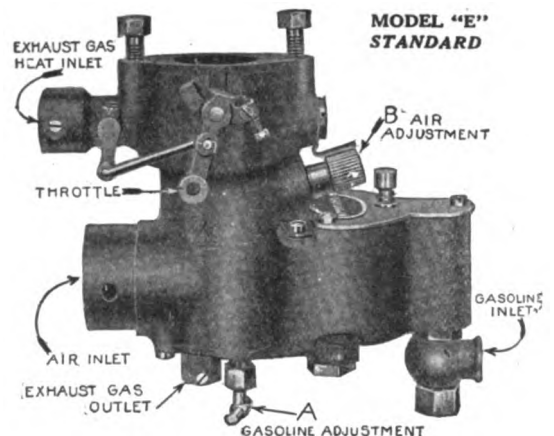
Lower Your Operating Costs For 1923

by using a compressor which develops the maximum possible efficiency for the power consumption.



Globe SIMPLEX Two-Stage Compressors are guaranteed to pump more air for the amount of current consumed than any other type of compressor on the market. Install one NOW and be ready for the new year with a drawing card which will hold your old customers and make new ones.

GLOBE MANUFACTURING CO.
Battle Creek, Mich.



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.

FLINT, MICHIGAN, U. S. A.



QUICK!

Get a can of

Black and White Valve Grinding Compound

Then you'll see how quickly it cuts. You'll see that it works smoothly, too, and with the lightest pressure imaginable.

It's a boon to every garageman — for BLACK & WHITE finishes valve seats with lightning speed, leaving them smooth as silk without a single ridge. There is still some desirable territory open for distributors. Write for our splendid proposition today.

And—get a can of BLACK & WHITE—now.

Abrasives Sales Corp.

17 East 49th St.

New York, N. Y.

Factory, Mt. Vernon, N. Y.

inside pulls, and is particularly well adapted for pulling timing gears or where space is limited by closely fitting gear cases, etc.

Extension arms allow a long reach for the smallest diameters. With a "Little Giant," the adjustment of one or more arms to a different length for uneven inside or outside pulls is made possible.

The principle used in construction—"The Harder the Pull—the Tighter the Grip"—prevents the arms from spreading and slipping off the work, and no arm locks are required. It gives the maximum of strength for its size, the arms are drop forged, and it is tested for a 10-ton direct pull.

You will find use every day for a "Little Giant" puller for all ordinary jobs, while a "Big Buster" will take care of the heavy work for you. Thus, in these two tools, you have a combination that will prove a most desirable addition to your shop equipment.

The "Little Giant" and "Big Buster" pullers are manufactured by the Premier Electric Co., 3802 Ravenswood Ave., Chicago, which also handles many other excellent items of automotive equipment, including: "Clean-E-Z-Prime" spark-plugs; electric vulcanizers; "Stickalite" trouble lights; "Hi-Lo" magneto horns for Ford cars; "Crowe" fan belts for passenger cars, trucks or tractors.

Inasmuch as this house specializes on telephone rebuilding, they have established a remarkable reputation on their radio products. The Premier radio line consists of variable condensers, jacks, plugs, variocouplers, tube sockets, dials, grid leaks, grid condensers, head sets and rheostats.

Any practical person cannot help appreciating the ease of operation and the reliability of the Premier radio receivers. To those planning the purchase of a receiving set, Premier receivers are worthy of most careful consideration.

Complete data and prices can be had by writing the company at their address as given above.

New Fabric Fan Belt Shown at Automotive Jobbers' Convention.

A new fabric fan belt, which has been in process of development through a period of two years, has been produced by the L. H. Gilmer Co., of Tacony, Pa., and was one of numerous innovations in automotive equipment shown for the first time at the convention of automotive jobbers in Chicago, November 13 to 18.

The belt was evolved in the Gilmer laboratories, where it is said to have displayed a stamina under test greatly in excess of any hitherto tested.

The belt is of a new weave, said to have accomplished the double purpose of preventing excessive stretching and minimizing the fraying at the edges which has been the principal objection to fabric belts. New ingredients which have not been previously

used in treatment, and a new method of application have contributed further to the resistance of the fabric against ordinary causes of deterioration. The belt has a metallic finish.

A pair of the new belts—several times the normal dimensions—was a part of the Gilmer display at Chicago. The latest Gilmer development is known as the Super-Service, and will be marketed to the retail trade in cartons containing five packets of two belts each, to be sold either in pairs or singly. The new twin package further emphasizes the original Gilmer idea of "carry a spare" fan belt.

The same company had on display at Chicago also a new dealer display stand for their radiator lacing, showing the method of attachment to the ledges on which the hood rests, the purpose of the lacing being to do away with rattles and squeaks. The lacing is marketed in package form, with just a sufficient amount in each package to equip a car—another new Gilmer service idea for the car owner.

Of even greater interest in the Gilmer booth was a motion picture, which was kept in constant operation, showing the change in the riding qualities of a car which can be brought about by the attachment of Bull-Dog bounce absorbers.

Dalton & Balch, Inc., Appoint Rosenbach Manager of Sales.

David Rosenbach announces his resignation as director of sales of the Farran-Kinney Co., of Chicago, to become manager of sales for Dalton & Balch of Chicago, manufacturers of genuine "D & B" silent timing gears.


Mr. Rosenbach has been in the automotive equipment field for over 20 years, and is well known to the trade, having been secretary of the Automotive Equipment Association and sales manager for the Rayfield carburetor.

He states that "D & B" silent timing gears offer him an opportunity of proving his pet theory—that the best way to service the car owner and dealer is to appoint one jobber distributor at each of the principal jobbing points in the country.

This plan, he states, makes it possible for the distributor to carry a large and complete stock of "D & B" silent timing gears on hand and the dealer need never be delayed over 24 hours in making replacements.

Bureau of Mines Reports Analyses of Exhaust Gas.

A report made by the U. S. Bureau of Mines states that the analyses of samples of exhaust gas, taken during road tests of 101 automobiles and trucks under normal conditions, showed an astonishing loss of gasoline due to incomplete combustion, and that at least half of this loss could have been prevented by proper adjustment of their carburetors.



Here you are! Champion air compressors to give service the way you want it and the way your customers like it. Dependable, easy to operate, reasonably priced. Both single and two stage, in range of sizes. And Champion Air & Water Stands—accessible, handsome, efficient. Just a line will bring you—very quickly—a catalog that is readable, liberally illustrated—exceedingly valuable to you. Get it now!

CHAMPION

Champion Pneumatic Machinery Co.

8164-66-68 S. Chicago Ave.

CHICAGO



INSTANSEAT seat instantly PISTON RINGS

Dealers say—"It pays to handle INSTANSEAT rings because:

Customers desire quick results—
Preventing passage of excess oil
guarantees against come-back jobs—
Individual virgin grey iron castings
insure good results after long usage—
and because

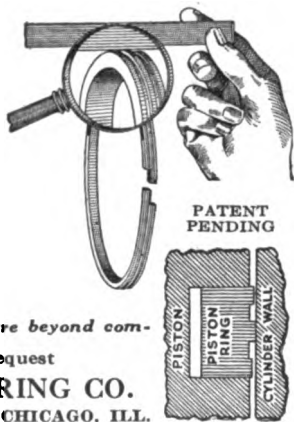
Quality, prices, and discounts are beyond comparison.

Sample ring mailed on request

KRASBERG PISTON RING CO.

117 No. Jefferson St.

CHICAGO, ILL.



Have them Rebabbed

Bearings of S. A. E. specification babbitt, poured in rod, broached to crankshaft size.

New bolts and nuts, laminated shims and new bronze bushings put in many of the popular type rods.

Bronze back bearings rebabbitted and machined to standard size or special sizes for reground crankshafts.

One-day service.

CONNECTING RODS

Send parts to factory nearest you for quickest service.

WATKINS MFG. COMPANY

206 North Waco St., Wichita, Kansas

INDIANA WATKINS MFG. CO.

26 West South St., Indianapolis, Indiana

ALL-STATES REBABBITTING SERVICE

6 East 4th Street, Waterloo, Iowa

WATKINS MFG. COMPANY

206 Wyoming St., Syracuse, New York




No Waiting for Soldering Iron to Get Hot



Instant Heat for Soldering, Radiator Repairing, Light Brazing, etc.

TORIT TORCH OUTFIT No. 13

Whether the job is lead burning, battery sealing, fender straightening, radiator soldering or loosening a rusty or corroded nut, the Torit No. 13 Torch is always ready at a second's notice to serve you, and the price is wonderfully low. It is handy for soldering tinware, babbiting, joining light tubing, aluminum soldering, soldering electrical connections, etc.

USES ACETYLENE ONLY

A splendid use for discarded auto acetylene tanks. Many owners make the Torit No. 13 pay for itself in a single day. Torch with 4 different tips, soldering copper, 5 ft. tubing and connection for auto acetylene tank.

\$7.50
in U. S.
\$10.00 in Canada

ORDER TODAY FROM YOUR JOBBER, OR
ST. PAUL WELDING & MFG. CO.
165 W. Third Street U. S. A. St. Paul, Minn.



Sentree

Guards Engine Efficiency

Auto Owners everywhere buy the Sentree on sight. Because this device guards motor efficiency by condensing vapors or anti-freeze solutions back into liquids keeping water supply constant—thus preventing overheating. It also warns of low water, etc. If first warning is not heeded, Sentree whistles until trouble is remedied.

Neat and attractive—no delicate parts—no glass to break—no wiring or complex parts to get out of order. Price \$8.50. Every car owner is a prospect. Some one will sell them in your territory. Will it be you? Write now for complete description.

Alert Alarm Company
607 N. La Salle St.
Chicago



Headlight Specifications Approved by Standards Committee.

One of the tribulations of the touring motorist—the hopeless attempt to comply with the automobile headlighting regulations of all the states through which he passes on his trip across the continent—will be removed as soon as the various state motor vehicle departments have all adopted the specifications of laboratory tests for approval of electric headlighting devices for motor vehicles which have been approved by the American Engineering Standards Committee.

At present the motorist whose headlighting equipment has been examined, tested and approved by the authorities of one state, has no assurance that his lights will be approved by any other state into which he may happen to drive, because there has been little agreement among states as to methods of testing automobile headlamps or as to what constitutes a proper and what a "glaring" headlight.

The approval of one set of specifications for such a test by the American Engineering Standards Committee—which is the national clearing house for standardization information and which provides the machinery for developing standards on a national scale—will place before the motor vehicle departments of all the states what represents the consensus of opinion concerning the most effective and most desirable method of testing automobile headlights.

Even before these specifications had been formally approved by the A. E. S. C., nine of the states indicated that they would adopt the specifications; in three states they are already in effect.

These specifications were submitted to the A. E. S. C. by the Illuminating Engineering Society. This organization and the So-

ciety of Automotive Engineers have been appointed joint sponsors for any revision and further development of the code which may be necessary.

Approval of the specifications was recommended to the American Engineering Standards Committee by a special committee which had been appointed to investigate their practicability and acceptability.

This committee, of which David Van Schaack, vice-president of the National Safety Council, was chairman, was made up of representatives of the automobile manufacturing industry, automobile accessory manufacturers, the officials of motor vehicle regulatory bodies, insurance companies, safety organizations, technical societies, and of the U. S. Bureau of Standards.

Proposed Atlantic City Speedway to Surpass All Others.

The International Speedway Association, of Atlantic City, N. J., has purchased a great tract of meadowland, 400 acres in extent, about 1½ miles from the Boardwalk, between the Pennsylvania railroad and the Absecon Blvd., for the purpose of constructing a speedway.

Plans have already been drawn by the Osborne Engineering Co., of Cleveland, Ohio, builders of the American League baseball grounds and the polo grounds in New York, for a 1½-mile banked board track, as well as mammoth concrete stands, capable of accommodating 150,000 persons.

John S. Prince, one of the incorporators of the association, has become internationally famous as a builder of automobile speedways, having constructed the new track at Kansas City. The track at Fresno, San Carlos, Cotati and Los Angeles were constructed by the Prince Construction Co.,

of which he is president. Mr. Prince is vice-president of the newly incorporated association and is enthusiastic over its success.

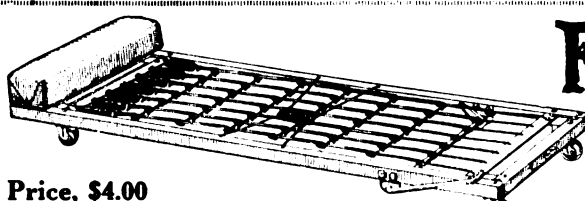
The association has the endorsement and co-operation of men prominently identified with the automobile industry in this country. They include Fred F. Duesenberg, of the Duesenberg Automobile & Motors Co., of Indianapolis, Ind.; J. G. Vincent, vice-president of the Packard Motor Car Co.; Harry C. Stutz, president of the H. C. Stutz Motor Car Co.; Fred Moskowsky, vice-president of the Marmon Co.; Barney Oldfield, president of the Oldfield Tire Co.; E. D. Rickenbacker, of the Rickenbacker Motor Co.; George B. Gerau, president of the National Shuttle Valve Motor Co.

These men are a unit in declaring that the site selected and its location in close proximity to Philadelphia, New York, Baltimore and Washington, where close to 10,000,000 of population reside within a hundred-mile radius, will insure it of success.

The plans of the association call for a track constructed entirely of wood, since it has been determined that better traction with less friction is obtained thereby, permitting much greater speeds. From a scientific point of view, it is said that this speedway will surpass all others in the country.

Besides motor races, the association, it is learned, proposes providing facilities for events like Olympic games and the army and navy football games, attractions which Atlantic City has been striving to secure for many years.

An inner track, of ¼-mile, will be provided for relay racing and motorcycle sprinting. Here, also, will be laid out a baseball diamond. The field will likewise provide facilities for horse shows, polo and the like.



Price, \$4.00

Foster Auto Repair Creeper for Garages and Auto Repair Shops

Constructed of metal throughout—angle iron frame and spring cradle support for the body of the repairman. Casters that pivot readily and make the creeper freely movable under load. Anchoring device that firmly locks the creeper in any desired position. Large enough to comfortably support a man without being cumbersome. Just the right dimensions for practical use.

FOSTER BROS. MFG. CO., UTICA, N. Y.

YAGER'S

Trade Mark Registered

SOLDERING SALTS

for soldering all metals—just dissolve in water and the flux is ready. Harmless, quick-acting—just the thing for automobile repairs.

Buy it from your jobber in ¼ lb., 1 lb., and 5 lb. cans.

New Prices for 1922.

ALEX. R. BENSON CO., Inc.
Hudson New York



"I am very much pleased with the AMERICAN GARAGE and AUTO DEALER. I got one idea from you that will just double my sales in 1922."

WM. J. BRAUN,
Braun Vulcanizing Co.
Wahpeton, N. Dakota.

KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by
THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.
Canadian Branch Factory at Woodstock Ont.

LET'S HAVE THAT NEXT ORDER!

**When you need a Doctor
Do you get estimates?**

NO! you engage a Physician in whom you have confidence. That's why you use F.A.A. ALUMINUM and CAST IRON MENDS. You have confidence in them in making permanent repairs, such as scored cylinders, cracked water jackets and aluminum castings.

**F. A. A. Aluminum and Cast Iron
Mends go straight to the job.**

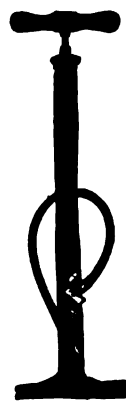
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**Distributors—Dealers—Agents
WANTED**

F. A. ALBERTUS & CO.
2640-42 Fond du Lac Ave., Milwaukee, Wis.
Western Distributor
CARL M. ANDERSON, Vineburg, California

AUTOQUIP PUMPS



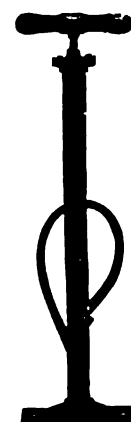
No. 21. Peerless Steel Barrel Anchored into base by Patented Process. Quick acting air chuck, heavy tubing, reinforced base with special ground grip flanges.

**PROFIT
Plus
ECONOMY**

There is profit for the dealer in selling one line of pumps—if within that scope he has A SIZE — A STYLE — A PRICE to satisfy every customer. There is also economy, for his turnover is naturally big.

AUTOQUIP Pumps are so recognized.

Write today for prices and discounts. Giving name of your Jobber.



No. 21 Paramount. High grade single acting pump. LOX-on Jr. Air Chuck. Brass Tube and Brass Check Valve. Heavy Reinforced Base, length 21" over all. A LIFE LONG PUMP.

Autoquip Mfg Co. Inc.
ROCHESTER, N. Y.
MANUFACTURERS OF

LOCKTYPE ANTI-RATTLERS



Pat. 2-18-'18.

**Spark Plug Troubles
Are Rare Occurrences
on the car equipped with**

**UNIVERSAL
SPARK PLUG INTENSIFIERS**

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken, or a plug fouled with grease or carbon. These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

JOBBERs and DEALERs—Your profit is liberal.
Write today for our attractive proposition

UNIVERSAL MFG. & SALES CO.

550 W. Harrison Street

CHICAGO, ILL.

WATERVLIT SPIRAL EXPANSION REAMERS

**WILL
NOT
CHATTER!**

Give full bearing surface with mirror-like finish.

For piston pin bushings on all cars. Ream for standard and oversize pins. A turn of the screw gives even, accurate expansion. Front and rear pilots assure perfect alignment.

Ask Your Jobber.
Write for Literature.

WATERVLIT TOOL CO., Inc., Albany, N.Y.

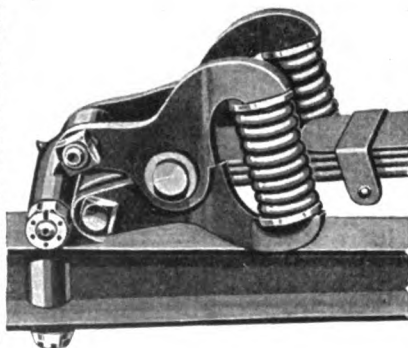
16 W. 61st St., New York

661-665 Turk St., San Francisco



**Star W-X Outshines All Other
Ford Shock Absorbers**

Give the greatest flexibility and comfort on either a normal or full load. Do not affect spring mounting of Ford Car. Simplest and easiest to install—car owner can do it himself. The biggest shock absorber ever offered at the price—\$8.00 per set of four. Three styles—No. 1 for Runabouts, No. 2 for Touring, No. 3 for Sedans. **DEALERS—** Here's a real money maker. Write today for full data.



STAR SPECIALTY MANUFACTURING CO.

227-233 W. Erie St.

CHICAGO, ILL.



BRUNNER
AIR COMPRESSORS

Get our Catalog of 1923 Models or see our exhibit at the winter shows.

BRUNNER MFG. CO. UTICA, N.Y.
Sales Offices: Utica, N.Y., Cincinnati, O., Kansas City, Mo., San Francisco, Calif.



This **EXPANDING RUBBER STOPPER** is a great time saver in your Radiator Repair Work.

Write today for our free catalog showing other time saving tools. We will gladly assist you in developing this line of automotive business.

F. L. CURFMAN MFG. CO., Maryville, Mo.

Every Tire Dealer Should Write For The Broadway Tire News

Just off the press—

It's a real money saver. It's timely—it's interesting. And it's sent without obligation to you.

Get on the mailing list now.

Broadway Tire Jobbers, Inc.
250 W. 54th Street New York City



V-Plex Piston Rings

A Few Agencies Still Open

REPUTABLE mechanics know the value of side expanding rings. This statement is proven by our large business with repair dealers.

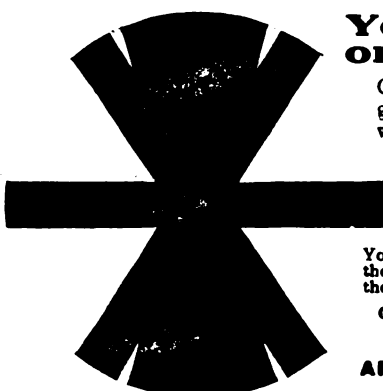
Over 90% of sales are repeat orders.

V-Plex rings embody many other special features of particular importance—may we explain them to you?

Exclusive county and sectional representatives for this remarkable, self-adjusting-to-wear-in-all-directions ring are being appointed. Possibly the agency for your district has not yet been assigned. Find out. Write now.

KRASBERG PISTON RING CO.
117 No. Jefferson St. CHICAGO, ILL.

You Don't Guess the Answer You READ It on the Blade



Cylinder measurements guaranteed accurate to within .00025" and less.

The AM-PÉ-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and instantly read the correct measurement.

Get the whole story in our circular.
PRICE \$1.75

AM-PÉ-CO SALES CO.
Marshalltown, Iowa



SIoux
Trade Mark Reg. U.S. Pat. Office

Standard Valve Tools for Fast, Accurate Work in Refacing, Reseating and Grinding

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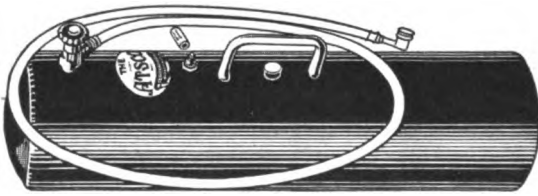
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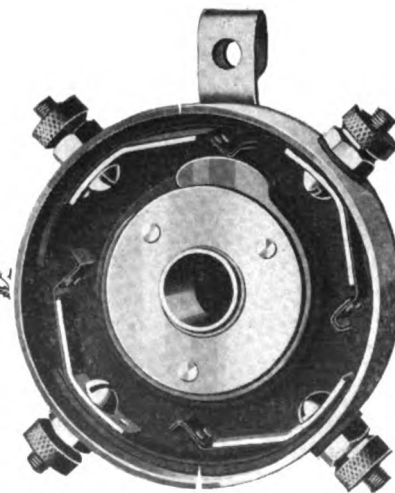
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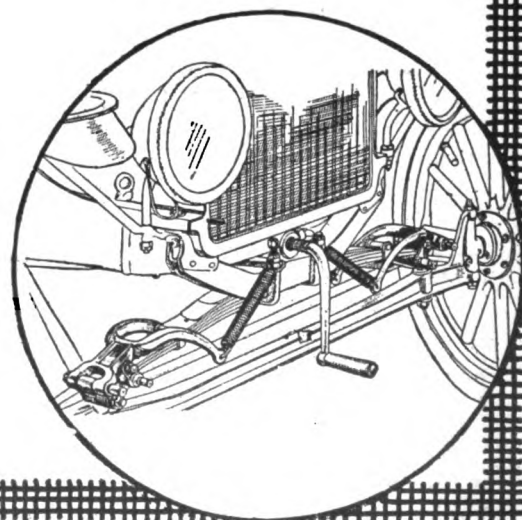
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